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AMERICAN
DYESTUFF REPORTER

Volume 46 July 15, 1957 Number 14

SELECTIVE SOLVENTS FOR ANALYZING TEXTILE FIBER MIXTURES

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INTRODUCTION

Since publication of the results of the comparative solubilities of natural and man-made fibers (*1*), the necessity of working further on this subject has been stimulated by various factors.

Several new fibers have appeared on the market, other man-made fibers have been modified with resulting changes in their behavior to solvents; some fibers such as silk have staged a comeback in commercial importance.

In addition, more promising solvents have been proposed in publications or advertising of chemical manufacturers and these had to be checked for their selectivity.

All these reasons inspired a thorough review of the solubilities of old and new fibers in old and new solvents. Several new fibers mentioned in the literature could not be included in this investigation because no samples were available or production of the fibers had not been started on a commercial basis.

The results of this work are presented in a newly arranged and enlarged chart (Table I) as compared to the one previously published (1). The first column shows natural and man-made cellulosic fibers, followed by other man-made fibers and, at the bottom, by man-made and natural protein fibers.

The column headings list aqueous solutions of alkali, acids, and salts followed by various organic solvents. The chart also includes the conditions under which 200-mg samples were tested on a dry basis.

EXPERIMENTAL

The basic principles used in the previous paper (*1*) were followed. Fritted glass crucibles (Corning C) proved again to be very handy and useful tools. When aqueous solutions are used the fiber residues have to be washed with cold and hot water before drying at 105°C. The drying step often causes a baking and undesirable sticking of the residual fibers to the fritted glass bottom of the crucible. This can be prevented by removing the adhering moisture by a final washing with alcohol. The fiber-mat will then be loose and soft after drying and can be easily removed from the crucible for further observation or treatment. The drying time can be shortened to one hour or less.

CELLULOSIC FIBERS——Going down the fiber column we see that the solubilities of natural and regenerated cellulosic fibers are essentially the same as previously reported. In addition to the usual diacetate fiber, there has been added a triacetate fiber under the trade name Arnel. The only discriminating solvent is chloroform (*2*), which instantly dissolves triacetate fibers. The diacetate fibers are insoluble in chloroform but are deformed in their fiber structure and form a cake.

TABLE I
Solubility Percentages

Test Conditions 200-mg Sample	NaOH 5%	HCl 6N	HCl 12N	H_2SO_4 60%	H_2SO_4 70%	Formic acid 90%	Acetic acid 100%	$ZnCl_2$ 67%	NH_4SCN or KSCN 70%	NaOCl 5.25%	Acetone	Dioxane	$CHCl_3$	Dimethyl formamide	C_6H_5Cl	m-Cresol
Volume (ml)	20	20	20	16	20	8	10	20	20	20	20	20	20	20	20	20
Time (min)	20	10	10	60	15	5	20	5	10	15	2 hrs	24 hrs	10	60	5	10
Temp (°C)	boil	room	room	room	38	room	boil	40–45	steam bath	room	soxhlet	room	room	room	boil	95–100
Type of fiber																
Cotton staple	6	3	6	6	98	2	3	4	0	4	0	2	0	0	0	0
Cotton bleached	2	0	4	2	100	0	0	100	0	0	0	0	0	0	0	0
Cotton mercerized	3	0	9	8	100	0	2	1	0	0	0	0	0	0	0	0
Wood cellulose	14	2	14	12	100	0	0	100	0	0	0	0	0	0	0	0
Viscose rayon	0	2	100	100	100	0	37	100	0	0	0	0	0	0	0	0
Acetate	42	1	100	100	100	100	100	100	0	0	100	100	0	100	0	100
Arnel	50	0	100	100	100	100	100	100	0	0	100	100	100	100	0	100
Nylon 66	0	100	100	100	100	100	100	0	0	0	0	0	0	2	0	100
Perlon-Nylenka	0	100	100	100	100	100	100	0	0	0	0	0	0	100	0	100
Dacron	5	0	0	0	2	1	2	0	0	0	0	0	0	99	0	100
Vinyon	0	0	0	0	2	0	1	0	0	0	100	100	100	100	100	100
Dynel	0	2	2	0	2	1	3	0	0	2	100	0	0	100	3	lumps
Saran	0	0	0	0	1	2	3	0	0	0	2	5	0	100	100	decomposes
Orlon	73	0	0	0	5	0	2	100	83	0	0	0	0	100	0	0
Acrilan	8	0	0	0	7	6	3	100	100	0	0	0	0	100	0	0
Darlan	100	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0
Vicara	8	0	0	0	0	0	0	0	0	49	0	0	0	0	0	0
Wool	100	0	0	0	0	0	1	0	0	100	0	0	0	0	0	0
Silk	100	0	100	100	100	4	0	100	2	100	0	0	0	0	0	0

NYLON———In addition to nylon, also named nylon 66, are two nylon 66's under the names Perlon and Nylenka, which are caprolactams. These nylon 6's behave alike and can be distinguished from nylon 66 by their solubility in N, N-dimethylformamide *(3)*, which leaves nylon 66 undissolved. All three types are soluble in 6N HCl *(4)* and thus can be separated from other fibers.

DACRON———Dacron is soluble in N,N-dimethylformamide and m-cresol. N,N-dimethylformamide is a solvent for many fibers, as the chart shows. Therefore, it cannot be used as a specific solvent for Dacron. m-cresol is a better suited solvent. It has been suggested to boil fibers with m-cresol *(5)*; but at the boiling point (209° C) m-cresol also dissolves acetate, nylon, Vinyon and wool. Acrylic fibers, such as Orlon and Acrilan, form orange cakes, which occlude m-cresol. Treating at 95-100° C is a better procedure. Wool fibers are not dissolved, acrylic fibers are not discolored and keep their fiber structure.

By first removing acetates with acetone, then nylons with 6N HCl, one can dissolve Dacron with m-cresol, leaving all other fibers in the residue. At this point a confirmatory test for Dacron might be mentioned. Dacron decomposes in boiling 40% NaOH to form a milky suspension, which dissolves completely on diluting with H_2O to a clear solution. Upon acidification with HCl a precipitation of terephthalic acid occurs. This acid can be identified among other reactions by its sublimation at about 300°C.

VINYON———Vinyon fibers are, like acetate fibers, acetone-soluble and can be separated from the latter with monochlorobenzene. Chloroform, although a solvent for Vinyon and a nonsolvent for diacetate fibers, is not recommended because it changes diacetate fibers to a cake as mentioned above.

ACRYLIC FIBERS——— As to the important acrylic fibers—Orlon, Acrilan—it was previously reported *(1)* that one could distinguish these two types with 57% $ZnCl_2$ solution, which dissolves Acrilan but not Orlon. Newer production samples of Orlon from March 1956 dissolved completely and even more rapidly than Acrilan in 57% $ZnCl_2$ solution. Therefore, this solvent can no longer serve for the separation of the two kinds of acrylic fibers. Another method has not been found yet.

Both acrylic types are soluble in hot 70% KSCN or NH_4SCN *(6)*. Acrilan dissolves completely and Orlon about 83% under the described conditions. All other fibers do not dissolve in these solutions.

WOOL———For the determination of wool in fiber mixtures, 5.25% sodium hypochlorite solution *(5)*—available as Clorox, Rose-X, etc—is an excellent solvent for wool, eliminating the boiling with 5% NaOH or the carbonization with 70% H_2SO_4 *(7)*.

SILK———Silk also decomposes and dissolves in sodium hypochlorite solution. To separate it from wool, one can dissolve silk in 67% $ZnCl_2$ *(1)*, 12 *N* HCl *(5)* or 60% H_2SO_4 *(8)*.

DYNEL, SARAN, DARLAN, VICARA———For these fibers, which are not discussed here, one can select suitable solvents from the chart.

CONCLUSIONS

The use of selective solvents for the separation of fiber mixtures continues to be a very valuable procedure in this field of analysis. With the help of a chart showing different solvents and their behavior to vegetable, animal and man-made fibers, is is easy to choose the appropriate solvent after a preliminary microscopic examinaton has indicated the types of fibers in a mixture. For this kind of work, fritted glass crucibles are very handy and useful.

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FUTURE PAPERS

THE following papers have been accepted for publication in future issues of AMERICAN DYESTUFF REPORTER. Those papers which will appear in the *Proceedings of AATCC* are indicated by the letter (P).

"Cleaning Synthetic Fur Pile Fabrics"—Dorothy Lyle, National Institute of Drycleaning (P)

"Dyeing of Orlon Acrylic Fiber—Application of Cationic Dyes"—J P Neary and R J Thomas, E I du Pont de Nemours & Co, Inc (P)

"Comparison of Wrinkle-resistant Finishes for Cotton"—T F Cooke, P B Roth, J M Salsbury, G Switlyk, and W J van Loo, American Cyanamid Co (P)

"Fibers and Equipment Used in the Manufacture of Nonwoven Fabrics"—Wendell E Brennen, American Viscose Corp (P)

"Dyeing Blends of Dacron Polyester Fiber and Cotton"—J J Iannaronne, Jr, P L Speakman, O S Larson, R C Hurt, and E H Hinton, E I du Pont de Nemours & Co, Inc (P)

"Lighting Factors to be Considered in Textile Color Matching"—Warren B Reese, Macbeth Daylighting Corp (P)

"Practical Problems in Purchasing"—Harold F Jones, E I du Pont de Nemours & Co, Inc (P)

"Cost Accounting for Effective Control"—Franklin R Ehman, Hellwig Dyeing Corp (P)

"Practical Problems in Inventory Control"—Hans Halbach Berkshire Knitting Mills (P)

"Effect of Certain Acid Dye Structures on the Rate of Wool Dyeing"—John H Skinkle and Edward W Makuch, Lowell Technological Institute (P)

"Introduction to Quality Control"—M Romer, Industrial Rayon Corp (P)

"New Aspects of the Pad-Roll System"—Bertil Mellbin, Svenska Textilmaskinfabriken

"Use of Silicones in Wet Processing"—F L Dennett, Dow Corning Corp

"Absorption of Water by and Drying of Untreated, Laundered, and Used and Laundered Cotton and Linen Toweling"—Florence E Petzel, Oregon State College

"Improvement of Heat Endurance of Cotton by Treatment with Dicyandiamide"—William G Sloan and Edmund M Buras, Jr, U S Dept of Agriculture

"Dispersed Growth Aeration of Cotton Finishing Wastes"—Nelson S Nemerow, North Carolina State College

"Characterization of Cellulose and Cellulose Derivatives by Means of X-ray Diffractometer"—L Segal and C M Conrad, U S Dept of Agriculture

HOW TO GET THE MOST OUT OF A REDUCING AGENT

Here's how an improved hydro makes it possible for one bleachery to use dry chemical feed for its pad-steam dyeing operation—a method that insures full utilization of the hydrosulfite.

TEXTILE chemists and engineers have recognized for some time that the best way to utilize the full strength of the sodium hydrosulfite used in pad-steam dyeing operations is to add the hydro to the caustic at the last possible instant before the caustic-hydro solution is fed into the chemical pad. Not only does this make it possible to save large quantities of hydro but also leads to more consistent results.

At Standard Bleachery and Printing Co, Carlton Hill, NJ, where Swan-white fabrics are processed, this is accomplished by using an improved hydro in a dry chemical feeder. The feeder meters out exact amounts of the hydro, a product of the Royce Chemical Co sold under the name of Vatrolite, into the caustic less than two seconds before the solution is fed into the pad.

According to Standard's research director, Carl H Brubaker, the hydro used in such an operation must be free-flowing even under atmospheric conditions of high humidity to make the use of a dry feeder feasible. In addition, the hydro must dissolve almost instantly in order to prevent lumping in pipe and gutter systems. The improved hydro, he reports, meets these requirements very satisfactorily.

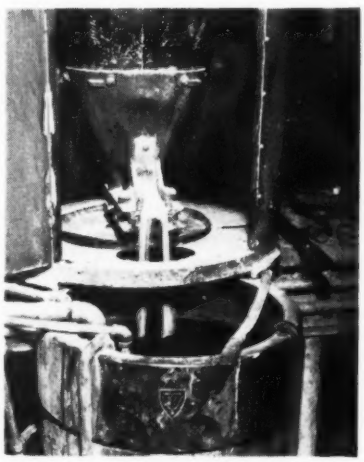
HYDRO FEED IS AUTOMATIC ——The speed of the chemical pad mangle is utilized at Standard Bleachery to control the rate at which the hydro is fed into the caustic. The actual amount varies from approximately 12 to 30 pounds per hour depending on type of material, type and amount of dyestuff, and processing speed. Automatic speed control is also employed between the succeeding oxidation and soaping operation; the speed of each stage is dependent on the speed at which the material passes through the following stage. This automatically compensates for changes in fabric dimensions. Overall speed of the equipment is set by a master rheostat before each run. A preliminary setting of the rate of hydro feed is made from formulas.

Sodium hydrosulfite is supplied to the Wallace & Tiernan feeder through a 250-lb storage bin. From here it is metered out into a ceramic mixing crock. Caustic soda solution under pressure enters the crock along its inclined diameter, setting up a centrifugal motion and submitting the hydro to strong mixing action. The crock terminates in a one-and-a-half inch stainless steel pipe that leads to the gutters and pad. At its lower end, the pipe divides into four inclined gutters separated from each other by stainless baffles. Each gutter serves a segment of the 30-gallon pad. Standard notes that this system gives much more even distribution of the caustic-hydro solution than is possible with conventional drilled pipe lateral feed arrangements.

While exact figures were not made available, they believe it possible for a dry feed system to get up to 20% more usable strength from the hydro than is possible with the older batch method. Considerable strength is lost while batch-mixed liquor is in storage, they explained. In addition, the dry feed method saves the time required for batch mixing and addition of the liquor to the pad.

ALSO USED IN JIG DYEING ——Sodium hydrosulfite is also used in Standard Bleachery's jig-dyeing department. Here it is added one pound at a time to each of the fifteen jigs. The product's improved solubility is said to greatly simplify this operation. In addition, they note that housekeeping in the drug room where the hydro is weighed out has been facilitated since the firm started using the improved product. They attribute this to the product being almost completely free of dust.

OVERALL VIEW OF PAD-STEAM DYEING OPERATION AT STANDARD BLEACHERY CO. Attendant in center is adjusting master speed control. Each stage of operation has its actual running speed automatically adjusted by the following stage. Dry chemical feeder is at the left. From 12 to 30-pounds of sodium hydrosulfite are added to the caustic per hour.



WALLACE & TIERNAN DRY CHEMICAL FEEDER METERS HYDRO INTO CAUSTIC. Hydro is fed into mixing crock along with caustic solution. Caustic-hydro mixture is delivered by gravity to chemical pad. Method gets full strength from the hydro.

• PATENT DIGEST •

PAUL WENGRAF

CALENDAR EFFECTS FIXED WITH RESINS———Mechanical Treatment in Wet State (G,4)

Brit Pat 761,548 (Bradford Dyers Assoc—Evans et al—Nov 14, 1956)

The preamble to this patent discusses the production of durable embossing and other calendering effects by resin application. Heretofore it has been standard procedure to apply the mechanical treatment to the fabric in the "just moist" state either by complete drying and subsequent moisture conditioning or by incomplete drying, leaving the goods in damp state. In the first case, premature partial resin formation may occur; in the second, drying to a predetermined moisture content is difficult to carry out and consequently uneven results in resin distribution within the goods can be expected. In general, the fabrics dried in one way or the other rarely do contain more than 20% moisture.

The inventors reportedly have overcome difficulties experienced in this field by impregnating the textiles with the fixing agent, ie, the resin precondensate solution plus catalyst or a colloidal resin solution, and subsequently mechanically treating the goods *without intermediate drying,* thereupon drying and curing if necessary.

An additional advantage of the method is that the mechanical treatment, when carried out in wet state, is facilitated because cutting or weakening of the threads by the embossing roller, which occurs frequently on dry fabrics, is avoided in the above wet treatment.

Example: A printed mercerized cotton poplin was run through a 10% dimethylolurea solution containing 0.1% dihydrogen ammonium phosphate and 0.1% stearamido-methyl-pyridinium chloride (Velan). The fabric was led from the trough while in saturated state through the nip of an embossing calender in which the steel cylinder, heated to 150° C, bore a crepe design in relief. Thereupon it was dried by infrared lamps and cured for 3 min at 150° C. The crepe design was found to be resistant to repeated soaping at 60° C.

Other examples refer to acid colloid methylated trimethylolmelamine solutions as fixing agents. Two of the examples also advocate impregnations with urea solution, embossing in wet state, followed by an aftertreatment with toluylene-2-4-diisocyanate.

Reference may be made to U S Pat 2,689,194 (Sayles Fin Plant) [cf *AM Dyestuff Reptr* 45, 147 (1956)]. Fabrics are impregnated with cellulose xanthate, embossed in wet state and fixed by a formaldehyde treatment, thereby avoiding the use of nitrogen-containing resin condensates as fixing agets.

DURABLE CALENDER EFFECTS ON THERMOPLASTIC GOODS———Mechanical Treatment in Wet State (G,4)

Brit Pat 764,088 (Bradford Dyers Assoc—Evans et al—Dec 19, 1956)

Brit Pat 761,548 (see preceding abstract) refers principally to cellulosic textiles which require a fixing agent for durable embossing, glazing, schreinering, etc effects. Brit Pat 764,088, copending with Brit Pat 761,548, is concerned with durable effects of the same type on *thermoplastic material* in general, excluding all fabrics formed from natural, cellulosic or protein fibers. The words "thermoplastic material" are used for fabrics made from thermoplastic fibers (nylon, polyvinylchloride, Dacron polyester or cellulose acetate) as well as for fabrics of any kind, woven or nonwoven, and coated with a thermoplastic film.

The patented process consists of wetting the fabrics and immediately subjecting them in the wet saturated state to the mechanical (calendering, etc) treatment. Although the pretreatment with water in itself reportedly may be sufficient, other substances apt to increase the effect by "thermal deformation", for instance, one of the known swelling agents (phenols or zinc chloride for nylon, dimethyl formamide for terephthalate fibers and so on), may be added.

Example: A plain-weave nylon fabric was passed through water and mangled to a pick-up of 45 p water for 100 p nylon. The wet fabric was embossed between an engraved steel roller heated to 177 C and a nonengraved elastic roller at a pressure of 3840 lb. This fabric showed better resistance to shrinking and retained the embossing effect better than a corresponding sample embossed in dry state under otherwise equal conditions.

IMPROVING RUBBING FASTNESS OF AZO DYEINGS———Aftertreatment with Amine-Alkyleneoxide Condensates (C,4,03)

Brit Pat 762,510 (Ciba Ltd—Nov 28, 1956)

Naphthol dyeings and prints customarily are soaped at the boil to increase their fastness to crocking.

The current invention aims to improve the rubbing fastness to a greater extent than is possible with the standard soaping procedure, and also to produce somewhat purer shades, which generally shift to a bluer tint. This effect reportedly results when soaping at the boil is replaced by a treatment with condensates of α-β-alkylene oxides with organic-amino-groups-containing compounds. Among the various possible products derived from aliphatic, alicyclic or aromatic amines, from alkanolamines, partial amides of polyamines with fatty acids and so on, the aliphatic or alicyclic amines containing at least 12 C-atoms are preferred. They have to be condensed with 4-50 mols of the alkyleneoxide—preferably ethylene oxide—per one mol of the amine.

The water solubility of these products may be increased by introducing solubilizing groups, particularly by quaternizing one of the amine-alkylene oxide condensates with an alkylating agent. An example is the product obtained by quaternizing the condensate of oleylamine with ethylene oxide by reacting it with dimethylsulfate.

Example: A naphthol print produced from 2-oxy-3-naphthoic acid-o-anisidide (Cibanaphthol RK or Naphthol AS OL) and diazotized 2-methyl-5-nitraniline was aftertreated during 30 min at the boil with an ethylene oxide condensate of a commercial mixture of oleylamine, octadecylamine and hexadecylamine. The prints were found to be faster to crocking than parallel samples, soaped at the boil. The naphthol ground proved to be removed to a great extent from nonprinted areas.

Reference may be made to USPat 2,002,613 (Gen Aniline Works/1935) advocating as textile assistants reaction products of higher molecular carboxylic amides with ethylene oxide.

According to Brit Pat 465,200 (I G Farben A G/1937), reaction products of higher amines with ethlene oxide may be used, among others, in developing baths of azodyes (cf Example #1).

Proceedings of the
American Association of Textile Chemists and Colorists

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Western New England Section———

FINISHES AND BLENDS FORM THE FUTURE*

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INTRODUCTION

EACH year the processing of fibers, yarns, and fabrics becomes increasingly complex. Not only are the chemical and mechanical treatments much more numerous than heretofore, but each new fiber introduces its own characteristic changes to established routines. The field of finishing is so broad today that most finishers have to become specialists in restricted fields before they can be of much value to the company employing them. So it follows naturally, due to specialization, that most of this discussion on finishing will be concerned with rayon and acetate, or blends, or mixtures containing one or more of these fibers.

Rayon and acetate differ in two principal characteristics. Rayon is not thermoplastic and is hydrophilic. Acetate *is* thermoplastic and is a more hydrophobic fiber. The finishes used on these two classes of fibers may be divided into the thermosetting chemical type for the hydrophilic fiber and the heat-modifying type for the hydrophobic fibers. The purely mechanical operations, such as napping, button breaking, etc, are used on both fibers.

With rayon, there are several basic properties, which, for best results in finishing, must always be given consideration.

1) Rayon fibers range in hand from soft to crisp depending on the denier. The finer the denier, the softer the hand of the fabrics made from these fibers. Fine denier rayons are used particularly to give strength to high-count yarns, and the soft hand resulting in fabrics made from these yarns may require a buildup in hand for certain end uses. The finisher must take care that this buildup be reasonably small and that it is of maximum durability. A fabric which quickly loses hand in normal use is a poor fabric.

2) Many constructions of rayon fabrics will show progressive shrinkage in repeated washings and dryings unless they are chemically treated in a satisfactory manner to prevent this change.

3) Many constructions of rayon fabrics will show dimensional changes up to $\pm 1.0\%$ when subjected to wide changes in humidity. This can be reduced by the same chemical treatment recommended for securing shrinkage control in washing.

4) Rayon can be reacted with low-molecular-weight aldehydes in the presence of an acid catalyst in order to change several of its physical properties. The rayon swelling is reduced, the stiffness of the fiber increases, and the extensibility is reduced both wet and dry. Immediately after this reaction has been accomplished, it becomes practical by compressive or relaxation shrinkage to control dimensional changes occurring in laundry procedure as well as to obtain a marked improvement in those dimensional changes taking place when subjected to wide changes in humidity. Properly chemically treated rayon might well be given a second name since it becomes a material having many changed physical properties and it cannot be returned to its original state. No unrestricted washable claims on rayon fabrics should be attempted without including some acid aldehyde reaction in the formulation.

5) Thermosetting resins can give to rayon a further increase in crease-resist properties. The fastness of these properties ranges from "dry-clean only" to warm-water washability. The hand, the dimensional control, and crease resistance are only constant so long as the amount of resin retained by the fabric is constant. When the resin is washed away then the properties of hand, crease resistance, and dimensional control are also lost. The truth of the first sentence in this paragraph is well known, but that of the last sentence is unfortunately ignored.

With these five basic properties in mind, I would like to offer formulations blended to meet selected end use classifications. If some of these formulations appear to call for many ingredients and therefore are confusing to the dyehouse help, then it is time that help was obtained that understood chemicals. If you want to do a good job, do not be afraid to blend the finishing chemicals as a good designer blends fibers in making fabrics.

DISCUSSION

DRESS GOODS——A) *Natural crease resist hand.* This is a very popular finish and one which is best obtained with the following combination:

cyclic urea	6–10%
urea-formaldehyde	8–12
lubricant	
catalyst.	

The reactant (CU) provides more durability than does urea-formaldehyde and gives fair crease resistance. The urea-formaldehyde provides the best in crease resistance but is of limited durability. The lubricant, which may be a water repellent or a true lubricant finish, is needed to aid in sewing as well as to provide some spot resistance in the case of the water repellent. The urea-formaldehyde is a very cheap resin and the temptation is to run it by itself as the consumer will never be able to see the difference on the counter. However, the durability of the urea-formaldehyde by itself is seldom good enough for quality finishing.

Crease resistance begins with the

*Presented before the Western New England Section on March 15, 1957.

fabric. The crease-resistant finish has had a heavy going over in the literature and, therefore, I will not spend much time on it except to point out that the designer of fabrics must realize that durable crease resistance is largely a feature of fabric construction. A fabric having good crease recovery without added finish will have very good recovery after proper treatment. A fabric having poor crease recovery without treatment will seldom ever reach the "good" classification even after treatment. By excessive loading a very poor construction fabric can be given fair crease resistance, but the consumer will not be happy with the poor durability of the crease resistance nor with the poor wearability of the garment.

B) *Built Hand.* Many dress goods today require a built hand. Crispness and fullness are the factors implied by such a finish. Both of these factors should be durable items. Crispness can usually be obtained by reacting on the fabric low-molecular-weight aldehydes or cyclic urea with cellulose ethers, starch ethers, starch, or polyvinyl alcohol. The two ethers give the best durability of hand to repeated washings and have reasonable add-on in weight.

Both crispness and some bulk may be obtained by applied syrup resin precondensates. In combination with aldehydes and/or cyclic urea, these can give good durability to built-up hands.

With both approaches to buildup of hand it must be remembered that crispness can bring brittleness and a lubricant is very important in order to aid in sewing operations and in flex abrasion.

Durability of crispness can be improved by over-finishing for crispness and then calendering to reduce the buildup. The calendering breakdown will then represent the normal breakdown in garment manufacturing or in actual preliminary wear and, therefore, less change in hand will be noticed during normal wear on calendered fabrics.

A typical formula is as follows:

starch ether	4.0%
formaldehyde	10.0
cyclic urea	6.0
syrup resin	2.0
lubricant	
catalyst---diglycolic acid	3.0

Procedure: pad, dry, cure, calender, wash, and dry.

C) *Wash and wear.* Regardless of what definition one uses, we are all interested in obtaining "wash-and-wear" finishes. As in crease recovery finishes, one must pick the fabric for properties contributing to wash andwear. A fabric which has some wash-and-wear properties to start will turn out much better after finishing than one which obviously had poor qualities for wash and wear before finishing. Challis and other coarse count constructions are the easier fabrics as a rule.

Good wash and wear characteristics are obtained by the following finish:

cellulose ether, starch ether	
cyclic urea	8-10%
low molecular weight aldehyde	10.0%
durable lubricant	
catalyst.	

The use of a calender is recommended after curing as an aid in durability of hand. Wash-and-wear finishes must be durable to washing; therefore, do no skip the formaldehyde or other aldehyde. Durable shrinkage control is important and there again the aldehyde is necessary. Chlorine-retention damage is important and again the aldehyde makes a great improvement. With wash and wear and with other shrinkage-controlled finishes, do not forget to apply tension at the time of padding on the chemicals. A stretch of 5-7% is usually proper at the pad and should be maintained through the next drying step. Obtain relaxation only in the final washing and drying steps after curing. This makes it much easier to obtain shrinkage control and at the same time saves yards in processing shrinkage per 100 yards of goods finished. If this stretching step seems strange to you, think about the mercerizing of cotton where the fabrics are chemically treated and neutralized under tension with resultant improvement in fabric properties, one of which is shrinkage control.

D) *Embossed finishes.* Closely allied to the wash-and-wear formulations are the embossed finishes. Not much is known today in the trade concerning embossing of rayon fabrics, and the reason for this lapse is largely because the resin formulations used on cotton have been tried rather than the combined acid formaldehyde, cellulose ether, reactant resin approach. The simple urea-formaldehyde and melamine resins do not give embossed effects on rayon durable to washing. When the acid-formaldehyde combination is used, either glazed or embossed effects can be obtained which have excellent durability to washing and normal wear. It is expected that such finishes will have increased acceptance in the near future. The formulations are similar to wash-and-wear finishes with the added specification that formaldehyde is the preferred aldehyde. So far the other aldehydes have not produced the desired effects. The embossing takes place on fabric dried to 15-20% moisture present. Spun rayon challis and crepes take this embossing very well and retain the effect through repeated washing at 140° F.

Procedure: pad, dry, emboss, cure, wash, and dry.

SLIPS, PAJAMAS, UNDERWEAR———

A) *Plissé.* A very interesting finish is the rayon plissé. There were a few patents on this finish taken out several years ago but the effects obtained had only limited durability to washing. Now with the use of acid-aldehyde pretreatment, these effects can be called permanent as they will perform without change through washing and wearing for the life of the fabric. This is a real wash-and-wear finish. Also this finish can be applied to continuous filament rayon to produce an appearance and hand not imitated by any other fibers. The factor which makes this finish is the acid-aldehyde reaction, which takes place prior to the routine caustic-gum application. The pucker obtained is of high quality.

Procedure: pad, dry, cure, moisten, caustic print, steam neutralize, and dry.

B) *Washable crepes.* These fabrics belong in the underwear, blouse, and dress goods classes.

The flat crepes of all rayon or of rayon and acetate can now be finished to have a pleasing hand and appearance as well as dimensional stability.

The blouse and dress crepes are more difficult to stabilize because of the higher twist and they require somewhat more care in handling, but the results are very satisfactory. With all the crepes, the acid-formaldehyde, cellulose-ether finish is used; but with the higher-twist fabrics, an embossed calendering operation on the partially dried, chemically padded goods is at present necessary for best results.

In passing it should be noted that the rayon crepes have a different action in wetting and drying than is seen with the majority of fabrics. A rayon challis, after relaxation, will grow when wetted and shrink on drying. A true crepe reverses this situation and, therefore, relaxation must take place during wet treatment and growth must be restricted during drying in order to end up with a stabilized crepe fabric.

FURNITURE, UPHOLSTERY, AND DRAPERIES—LOOM FINISH ———This type of finish is, of course, very limited in flexibility, but it is

an efficient economical approach and, therefore, will probably continue to grow in volume in the future. What is new in this line of work? It is now being demonstrated that rayon warps can be given very durable finish characteristics by applications of low-molecular-weight aldehydes, catalysts, protective sizings, and lubricants in the size bath. The odorless sources of the aldehyde are necessary here. Some curing can be obtained during drying on the slasher cans, but usually the fabrics require curing after weaving. After curing, the woven fabric can be given a light steaming relaxation or a compressive shrinkage step in order to promote good dimensional stability. The wet-finishing cycles are avoided, and yet the fabric can be made to give improved performance.

RAYON BLEND FINISHING ——Rayon blends provide an interesting subject and one which will continue to grow in importance. A major reason for this is that most of the newer fibers, as mentioned before, are hydrophobic and therefore are subject to both static and to water-absorption problems. Rayon is an ideal blending fiber for these hydrophobics because it brings with it good water-absorption properties and good resistance to static formation. Transpiration of perspiration is an important function of clothing in order to provide comfort. Rayon fibers aid greatly in such transpiration in the blend fabrics. The lighter-weight fabrics so popular today are much more affected by static than the older, heavier fabrics. This is shown by the fabrics which cling to the body in a manner which spoils the shape of pants or shirts and gives discomfort to the wearer. The presence of 30% or more rayon in a blend fabric controls this static tendency caused by the hydrophobic fibers. The hand of the hydrophobic fibers in flat fabrics with the exception of acetate is not always appealing to the touch, being somewhat harsh or without life, and the addition of rayon in a blend softens and gives life.

In the finishing of these blends, a general rule is to consider the dominant percentage of the fiber present. With all blends so far considered, nearly all properties, with the exception of temperature effects, are largely a function of the fiber whiich is present in greater than 50% amounts.

RAYON AND NYLON——A high percentage of tufted carpet yarn today is made of rayon-and-nylon. Rayon, of course, is used a great deal in 100% yarns in carpets, but some of the blends are newer and have brought some interesting finishing techniques. Thirty percent of nylon is the minimum needed to give heat-setting effects to such blend yarns. This means that twist can be set by steaming or water treatment, which will hold the twist in both the rayon and nylon while in the carpet. Frieze effects can be obtained with blends at a lower figure of cost than with 100% nylon and the carpets have the advantage of the rayon appearance and low static formation, and the nylon gives extra resistance to abrasion.

Another large-scale use of blend fabric of rayon/nylon is in the field of blankets. Rayon shows a marked advantage over almost any other fiber in its ability to be napped without high loss of yarn strength. This is one of the best-established blends and, therefore, the finishing is an old story.

RAYON AND ACRILAN——Blends of rayon and Acrilan can also be made for carpet purposes with excellent heat-setting properties. A typical treatment would be as follows:

> Plied yarns with from 5-10 turns per inch are heat-set, preferably in the skein form at 2350 F in water for 20 minutes. This can be done by placing loose skeins of the twist yarns in a stock-dyeing basket of a pressurized dyeing machine. As an alternate method, the yarns may be steamed at the same temperature for 25 minutes. If the heat can be forced into all parts of the skeins quickly, then it is possible to lower the time of exposure in both cases. The higher twists produce a tight, so-called frieze tuft. The lower twists give a nubby tuft with greater bulkiness. Also the higher the content of acrylic fiber, the tighter the tuft.

Rayon-and-Acrilan flannels, linen-look fabrics, tropicals, and sheen gabardines are all contributing interesting new blends. Most of these are wash-and-wear items with the larger proportion fiber being Acrilan. The dimensional control is obtained by the acrylic fiber, which also gives the crease-retentive property to the fabric. The rayon provides a soft touch and eliminates the tendency towards static formation. In addition, it provides a base for additive finishes such as melamines, which seem well adapted to these wash-and-wear blend end uses. Cationic softeners and silicones are often used to provide spot resistance and a durable hand. Mechanical finishing is quite straight forward with napping used to give fabrics such as flannels an added attractive, soft surface. The degree of napping is dependent upon the end use.

RAYON AND DACRON——This summer will see the further establishment of the rayon-and-Dacron blends in mens' suits, particularly of the minimum-care variety. These blends usually contain from 60-50% of Dacron and 40-50% of rayon staple. These blends contain a sufficient quantity of the fiber requiring heat-setting to depend on that method of stabilization. The combination of properties of the two fibers has been engineered to produce fabrics having unusually good properties. The finishing techniques call for the use of open-width, hot-water setting and preliminary wet out and finally the brushing and singeing operations to decrease the pilling tendency of the Dacron.

Many blends are now being made with more than 50 rayon and using Dacron alone or Dacron and nylon in 25-30% amounts in either warp or filling at right angles to the direction in which crease retention is desired. In these fabrics the proper finishing method calls for the use of cyclic ureas and/or acid aldehyde to control the shrinkage of the rayon. The dry heat used during curing of the additives also aids in reducing pilling tendencies of the Dacron.

COTTON AND RAYON——Cotton-and-rayon blends are just beginners as a combination in the field of blends, but they can be expected to become more and more important in the near future. Rayon is more economical to run into yarns and fabrics when equal weight of medium count yarns are compared. This is a major reason to start thinking in terms of blends. Cotton can be used to provide the blend with the stiffer hand needed in sheetings, shirtings, and the like. In finishing, the presence of rayon reduces the need for the intense preparation steps needed on cotton. Rayon will take the addition of resins without the degree of loss of tensile and tear, which occurs on 100% cotton. Adding these properties together, a cotton-and-rayon blend will sometimes be stronger than 100% cotton because of the loss of strength encountered by 100% cotton in kier boiling and the fact that it is not necessary to kier boil the blend. After resin treatment, the same cotton-and-rayon blend will be considerably stronger and have a better tear

(*Concluded on page P516*)

Perkin Centennial———

THE STANDARD DEPTHS OF SHADE IN RELATION TO THE ASSESSMENT OF COLORFASTNESS OF DYES ON TEXTILES*

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As the results of colorfastness tests of dyestuffs depend on the depth of shade, such tests are usually carried out on dyeings having a depth of shade defined by a standard of comparison or "standard depth." The standard depth of the ECE (Europaeisch-Continentale Echtheits-Convention) is represented by 18 wool dyeings that differ in hue and saturation but which are visually matched with the same depth of shade. In checking the depth of dyeings to be tested for colorfastness against these standards, uncertainties may be experienced because of differences in hue, in brightness, and in the substrate (matt or luster). Thus, there is a genuine interest in the development of an objective method of measuring the depth of shade.

For the development of such a method in the present investigation, the color coordinates of the standards in the CIE color space were determined and the saturation and darkness degree (Dunkelstufe) established according to the system of the DIN (official German Color Standard) chromaticity diagram. It is shown that a mathematical interrelationship exists between the darkness degree and saturation of the standards which permits the establishment of a formula for the depth of shade. Thus, it is possible objectively to establish and determine the depth of the standard.

The color depth formula was first successfully applied in dyeing a second series of standards on lustrous viscose material. In continued investigations, series of standard types in 1/3, 1/6, 1/12, and 1/25 of the standard depth have been established. A visual check of these calculated series of types with reduced depth shows a satisfactory conformity of the color depth of shade over the individual series, as well as of the equal intervals of the series from each other.

THE color of his environment has always played an important part in the life of man. Preceptress of color in its infinite variety and harmony is Nature herself. The source of color is light. Man perceives color with the eye, but a sense of harmony is a psychological process and therefore subjective. The natural cycle of growth and decay creates, and recreates anew, the colors which surround us. Each season has its own color harmonies. Summer brings the most diverse colors, while in winter mainly subdued colors are seen, predominantly all shades of black and white, occasionally brightened by a blue sky. To satisfy his need for color man began at an early period to give his belongings a colored exterior, first using any available products which were suitable in their natural state and only at a comparatively late date employing synthetic dyes for this purpose.

A century ago an Englishman named Perkin discovered mauve, the first synthetic dye, which through the pioneer work of A W von Hofmann became the prototype of a large number of brilliant dyes comprising the basic dyestuff range. This was the beginning of a development which, based on diazo compounds discovered in 1858 by Peter Gries, opened the way for the large field of azo dyes up to the end of the 19th century, and early in the 20th century for the highly important vat dyestuff range through the work of René Bohn. Although the colors of the first synthetic dyes were indeed beautiful, it was soon discovered that they were anything but fast. It was therefore inevitable that the initial enthusiasm for these products, with which such beautiful and brilliant colors could be obtained, should give way to bitter disappointment, an opinion of their worth being expressed in the phrase "fugitive as an aniline dye". Today, however, after the lapse of a century, basic dyes are gaining ever-increasing importance with the development of synthetic fibers!

Development in the other dyestuff groups has led, nevertheless, to the production of progressively faster dyes and, in particular, to the realization that the fastness of a dyestuff is not only governed by its chemical composition but also depends upon the material to which it is applied and upon the depth of shade. The conception of fastness is also related to the purpose for which the dyed material is required. Fastness is therefore only a relative term. There is no such thing as absolute fastness. It has long been known that the wetfastness properties of dyed textiles decrease as the depth of shade increases, whereas their fastness to light increases.

As late as the 20's of the present century the fastness properties of a dyestuff were evaluated by comparing them with those of well-known products of approximately the same, though on the whole somewhat arbitrarily selected, tinctorial strength.

A perusal of the "Processes, standdards and types for evaluating the fastness properties of textiles" published by the German Fastness Committee will reveal that, as late as 1930, when evaluating fastness to light, for example, separate standards of comparison were recommended for each type of textile fiber, which in addition to being very heterogeneous tinctorially were also incapable of comparison with one another. In much the same case was the evaluation of the wetfastness properties, such as fastness to water, washing, perspiration, etc. In this case, too, comparison was made with a most diverse selection of specially graded standard shades, which were also generally different for each fastness test. To make matters worse, not only were separate fastness to light standards used for the different processes, but the remaining test methods usually varied with the type of fiber to which they were applied. There were, for example, 7 different methods for fastness to washing alone. This precluded any possibility of comparing the fastness evaluations obtained by the former test methods in which different bath compositions, liquor ratios, times and temperatures were used. This problem has recently assumed the highest importance in view of the introduction of numerous new fibers and a wide range of blended fabrics. It therefore appears

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necessary first to carry out fastness tests as far as possible under identical conditions and secondly—a most important point—to refer the results to the same depth of shade.

For this purpose the so-called "auxiliary types" are used. The first standards of this kind were created at the end of the 20's as a result of collaboration between German and Swiss dyestuff manufacturers. They comprised dyeings of approximately the same tinctorial strength, estimated visually, dyed to a given depth of shade in the main colors yellow, orange, red, purple, violet, blue, green, brown and grey on wool, cotton, silk and rayon. They were originally intended only as an aid in the evaluation of fastness to light and were produced only in this single depth of shade.

Fastness to light was tested by dyeing the dyestuff concerned to the depth of the auxiliary type of similar shade—known as the standard depth —and then exposing the dyeing to light together with the standard type. This procedure ensures that the fastness evaluations of the dyestuffs, or the respective dyeings, are comparable in this single depth of shade. No provision was made, however, for a comparison of paler or darker shades than those of the standard types for the various colors. As an expedient, the dyestuff quantity required for the standard depth was merely doubled or divided by 3, and the shades obtained in this way were then exposed to light. Although it was usual to speak of double standard depth or 1/3 standard depth, the results obtained by this method were incapable of comparison owing to differences in dyestuff affinity. A note was therefore included in the pattern cards of the dyestuff manufacturers stating that, of the 3 evaluations for fastness to light, only the middle figures, printed in bold type, were capable of comparison throughout the different ranges. The following example will serve as an illustration: assuming that two dyeings of the same tinctorial strength in standard depth require 4.2% of dyestuff A with moderate affinity but only 2.7% of dyestuff B with a higher affinity, then a simple division of the dyestuff quantity by 3 (dyestuff A 1.4% and dyestuff B 0.9%) due to the difference in affinity will not give dyeings of equal tinctorial strength and the fastness evaluations will therefore no longer be comparable.

For this reason a start has recently been made to produce dyeings of equal tinctorial strength in other

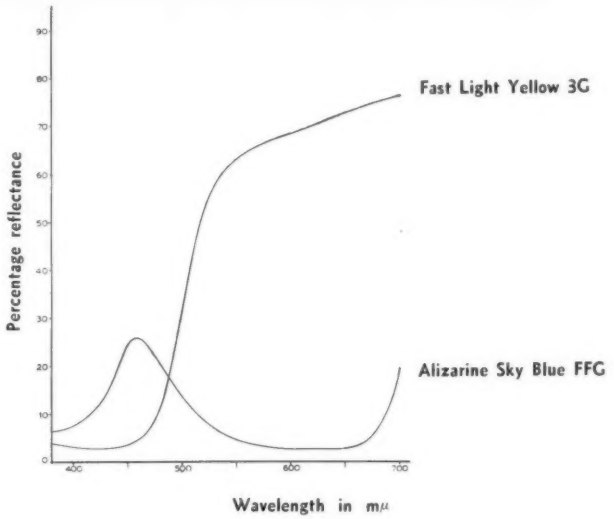

Figure 1
Reflectance
Spectral distribution

depths of shade than the medium standard depth, namely in very pale shades of 1/25 standard depth and in double standard depth, according to a decision reached by Committee TC/38 SC1 of the International Organization for Standardization (ISO) at a meeting held in June 1955 at Scarborough, England. To avoid the necessity of carrying out a tremendous number of tests on many different types of fiber, this work has been confined to the production of auxiliary types on a matt material (wool) and on a bright material (viscose satin). For this purpose a suitable method of producing this auxiliary type range was needed to ensure that in tinctorial value is actually corresponded to the prescribed 1/25 standard depth.

The first attempt in this direction was made by Schwen, Eisele and Hafenrichter (*1*). The first step was to dye to the medium standard depth on wool acid dyestuffs of high affinity 18 shades estimated visually to be of the same tinctorial strength. The quantity of dyestuff taken up in each case by the fiber was determined colorimetrically from the dyestuff content of the residual liquor. The dyestuff pick-up of the wool ascertained in this manner was then used as a basis for the production of further auxiliary type ranges in double, 1/3, 1/6 and 1/12 of the dyestuff quantity ascertained for the standard types, again controlled by determining the quantity of residual dyestuff in the bath.

The results obtained show very close agreement in the depth of shade of the different weaker ranges with the exception of yellow and orange, where the shades obtained in 1/3, 1/6, 1/12 and 1/25 standard depth are much too deep. This is most easily recognized by comparing the changes in depth with the 1/1 standard range. A much greater difference will then be observed in blue, green or grey than in yellow or orange.

Although a means had been found of producing weaker ranges in approximately the same depth of shade, at least on wool, over the entire spectrum, there still remained the difficulty of applying the results thus obtained to bright material with quite different dyeing properties. While in the dyeing of wool the dyestuff is bound to the fiber mainly by means of a chemical reaction, the conditions in this connection are much more instuff on the fiber could be determined by completely exhausting the dyebaths, eg, with a fiber of high affinity, such as cuprammonium rayon, which could certainly be achieved, this would not, apart from the difficulty of the process, enable the depths of standard shades dyed on wool to be applied to those dyed on cellulose fiber, since an evaluation of the tinctorial strength of the dyeings would still only be based on an uncertain visual comparison. It was therefore of vital importance to develop an objective method of determining the depth of shade on a colorimetric basis. Such a method has been developed by Dr Koch of the physical department of the Farbenfa-

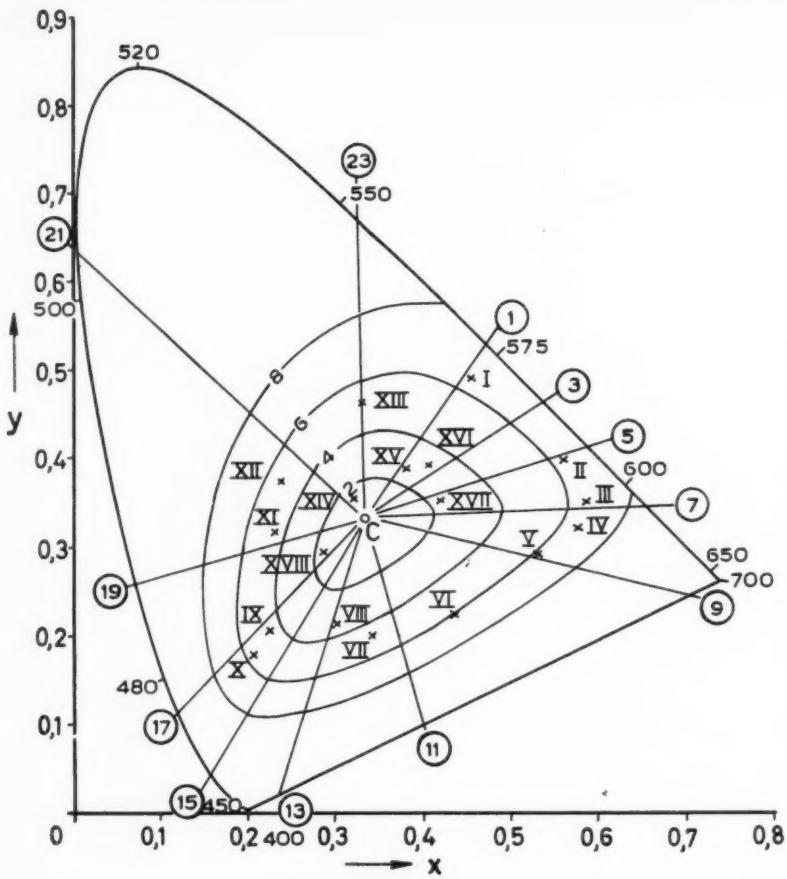

Figure 2
Chromaticity diagram for basic stimulus C
DIN Color Chart system

	D
I — Fast Light Yellow 3G	0.8
II — Orange II	1.1
III — Supranol Fast Scarlet FGN	1.6
IV — Acilan Scarlet V3R	1.9
V — Supracen Red B	3.4
VI — Acilan Fuchsine 6B	3.8
VII — Supracen Violet 3R	4.4
VIII — Acilan Fast Violet RR	5.8
IX — Diamond Blue BHG	5.4
X — Alizarine Sky Blue FFG	4.1
XI — Alizarine Cyanine Green GWA	5.9
XII — Alizarine Cyanine Green 3G	5.6
XIII — Naphthol Green B	5.4
XIV — Diamond Chrome Olive BL	6.7
XV — Diamond Chrome Olive GG	6.2
XVI — Diamond Chrome Olive 6G	6.1
XVII — Supramin Brown R	6.5
XVIII — Acid Alizarine Grey G new	6.4

briken Bayer in collaboration with the coloristic department.

First, the reflectance curves R of the 1/1 auxiliary types on wool estimated visually to be of the same depth of shade were determined with a recording spectrophotometer (General Electric-Hardy). Fig 1 shows, as an example, the reflectance curves of Fast Light Yellow 3G and Alizarine Sky Blue FFG. An integrator incorporated in the spectrophotometer gives the chromaticity coordinates X_c, Y_c, Z_c direct

$$X_c = \int_{400}^{700\ m\mu} R\lambda\ S\lambda\ \bar{x}\lambda\ d\lambda$$

$$Y_c = \int R\lambda\ S\lambda\ \bar{y}\lambda\ d\lambda$$

$$Z_c = \int R\lambda\ S\lambda\ \bar{z}\lambda\ d\lambda$$

for standard source C in a color space

TABLE I
1/1 Standard Types on Wool

Type No.		X_c	Y_c	Z_c	x_c	y_c
1	Fast Light Yellow 3G	58.0	63.6	9.5	0.443	0.485
2	Orange II	45.6	33.0	4.6	0.548	0.397
3	Supranol Fast Scarlet FGN	32.9	20.0	4.6	0.572	0.348
4	Acilan Scarlet V3R	28.7	16.3	6.5	0.558	0.317
5	Supracen Red B	16.8	9.4	6.9	0.507	0.284
6	Acilan Fuchsine 6B	16.0	8.4	15.2	0.404	0.213
7	Supracen Violet 3R	12.7	7.6	20.7	0.309	0.186
8	Acilan Fast Violet RR	5.6	4.0	10.8	0.273	0.197
9	Diamond Blue BHG	4.4	4.1	13.3	0.201	0.188
10	Alizarine Sky Blue FFG	6.6	5.8	23.6	0.183	0.162
11	Alizarine Cyanine Green GWA	4.4	6.1	10.2	0.211	0.294
12	Alizarine Cyanine Green 3G	5.0	7.9	9.8	0.219	0.349
13	Naphthol Green B	6.9	9.9	5.4	0.311	0.447
14	Diamond Chrome Olive BL	5.0	5.6	6.1	0.299	0.336
15	Diamond Chrome Olive GG	6.9	7.2	5.2	0.359	0.373
16	Diamond Chrome Olive 6G	7.0	6.9	4.3	0.386	0.379
17	Supramin Brown R	5.9	5.0	3.9	0.396	0.339
18	Acid Alizarine Grey G new	4.6	4.8	8.1	0.263	0.274

with basic stimulus E (color point of the equal-energy spectrum). The spectral energy distribution $S\lambda$ of standard source C corresponds in the visible region of the spectrum largely with that of natural daylight with an overcast sky. $x\lambda$, $y\lambda$, $z\lambda$ are the known CIE-spectral distribution curves. The results, which can also be obtained with any sufficiently accurate reflectance spectrophotometer and subsequent numerical calculation, are given in Table I.

For representing and evaluating the results the DIN color chart 6164 system proved to be more suitable than the Munsell system. The chromaticity co-ordinates of Table I were therefore converted for a color space with basic stimulus C ($X=1.011$. X_c; $Y=Y_c$ and $Z=0.8477$. Z_c) and are illustrated in Fig 2 in a chromaticity diagram according to the DIN color chart system.

$$x = \frac{X}{X+Y+Z};\ y = \frac{Y}{X+Y+Z}$$

In this system a distinction is made according to *shade T*, *saturation S* and *darkness degree D*. Shade and saturation are obtained from interpolation between the plotted group of curves, while the darkness degree is derived from the luminous reflectance Y of the surface color and the maximum possible luminous reflectance Y_o at the same color point according to the formula

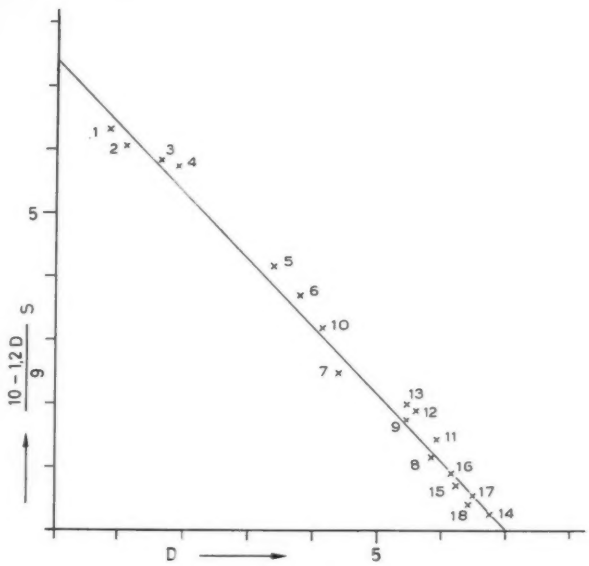

Figure 3
Standard types
Relation between saturation and darkness degree

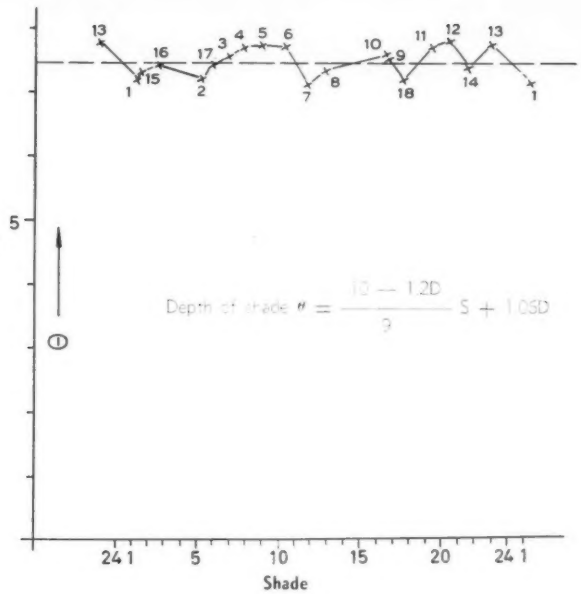

Figure 4
Standard types 1955
Calculated depth of shade θ

ECE STANDARD TYPES 1955

1 — Fast Light Yellow 3G
2 — Orange II
3 — Supranol Fast Scarlet FGN
4 — Acilan Scarlet V5R
5 — Supracen Red B
6 — Acilan Fuchsine 6B
7 — Supracen Violet 3R
8 — Victoria Fast Violet RR
9 — Diamond Blue BHG
10 — Alizarine Sky Blue FFG
11 — Alizarine Cyanine Green GWA
12 — Alizarine Cyanine Green 3G
13 — Naphthol Green B
14 — Diamond Chrome Olive BL
15 — Diamond Chrome Olive CG
16 — Metachrome Brown 6C
17 — Supramin Brown R
18 — Acid Alizarine Grey G new

$$D = 10 - 6.1723 \log (40.7 \frac{Y}{Y_o} + 1).$$

Y_o can be ascertained from tables and D from a graph $D = f\left(\frac{Y}{Y_o}\right)$

From Fig 2 it can be seen that no law can be directly derived for the existence of the auxiliary type depths. As might be expected, the color points lie neither on a curve of constant saturation nor at a constant darkness degree. It may, however, be assumed that for the auxiliary type depth a definite connection exists between saturation and darkness degree, because, for example, Fast Light Yellow 3G (S=6.3; D=0.8) and Metachrome Brown 6G (S=3.1; D=6.1) are evaluated as being of equal depth and the decreased saturation is in this case evidently balanced by the increased darkness degree. In order to find such a connection it must also be remembered that with S constant the visually observed saturation S′ decreases as the darkness degree increases. An attempt was therefore made (after various other trials) to plot for all the auxiliary types the corrected saturation

$$S' = \frac{10 - 1.2\,D}{9}\,S$$

over the darkness degree D. As can be seen from Fig 3, a linear connection surprisingly exists between both values, since a mean straight line can be drawn through the measuring points. This line has an approximate inclination of 45° so that the decrease by 1.06 saturation degree S′ corresponds to the increase by one darkness stage. For calculating the depth of shade (auxiliary type depth) a simple formula can be laid down by the linear addition of corrected saturation and darkness degree.

$$\theta = \frac{10 - 1.2\,D}{9}\,S + 1.06 \cdot D$$

The result of a computation of the depth of shade with the aid of this formula for the auxiliary types of the ECE (1955) is shown in Fig 4. On an average, the same computed depth of shade $\theta = 7.5$ with a mean deviation of about 3% is obtained for practically all the auxiliary types. A formula has thus been laid down with the aid of which the depth of shade (in particular the standard depth of the auxiliary types) can be determined objectively. At the same time this result also confirms that the original selection of auxiliary types obtained by a mere visual estimate has led to a very uniform depth range. The small deviations of the auxiliary types from this computed mean depth dependent on shade are not entirely unsystematic, as can be seen in Fig 4. For more accurate evaluation it is therefore necessary to consider the small departure from θ with the shade.

For the purpose of comparison, Fig 5 illustrates the result of a depth of shade calculation according to a formula of Godlove based on the Munsell system (2). The much greater disparity between the computed values (5%) can be recognized and also the very marked deviations of the formula in the yellow and red ranges, to which Godlove himself referred. To the best of our knowledge no other formulas for calculating the depth of shade have been published up to the present.

The newly developed formula for depth of shade has already been used for dyeing an auxiliary type range in 1/1 standard depth on bright viscose material, which is coloristically difficult to evaluate. The small departure from the calculated depth of shade θ was also considered with the

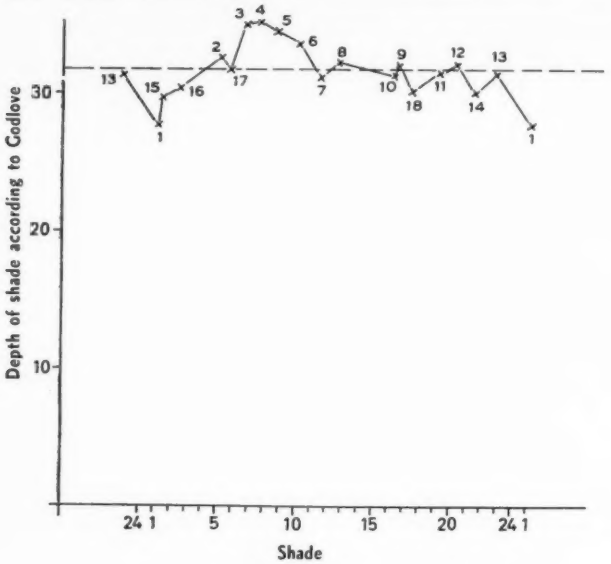

Figure 5
Standard types 1955
Depth of shade according to Godlove

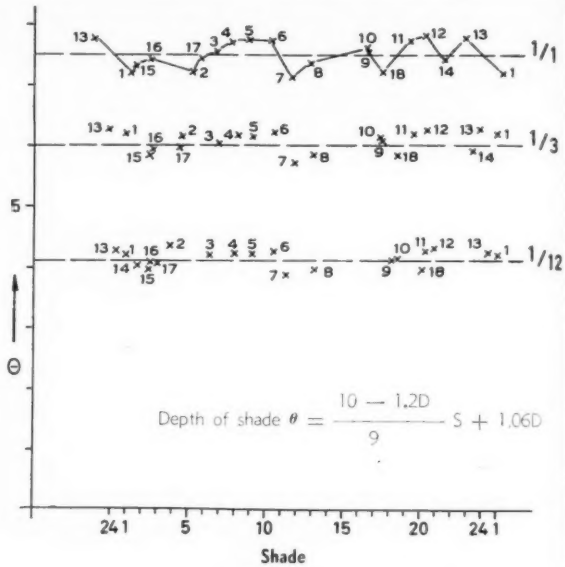

Figure 6
Standard types
Depth of shade 1/1; 1/3; 1/12

ECE STANDARD TYPES 1955

1 — Fast Light Yellow 3G
2 — Orange II
3 — Supranol Fast Scarlet FGN
4 — Acilan Scarlet V3R
5 — Supracen Red B
6 — Acilan Fuchsine 6B
7 — Supracen Violet 3R
8 — Acilan Fast Violet RR
9 — Diamond Blue BHG
10 — Alizarine Sky Blue FFG
11 — Alizarine Cyanine Green GWA
12 — Alizarine Cyanine Green 3G
13 — Naphthol Green B
14 — Diamond Chrome Olive BL
15 — Diamond Chrome Olive GG
16 — Diamond Chrome Olive 6G
17 — Supramin Brown R
18 — Acid Alizarine Grey G new

shade. The range obtained by a calculation of the depth of shade was also found to agree in depth when evaluated visually.

An attempt was then made to apply this formula to the still unsatisfactorily solved problem of preparing ranges in reduced depths of shade (1/3, 1/6, 1/12 and 1/25 standard depth). It was anticipated that the same percentage reduction in the computed depth of shade Θ of the 1/1 auxiliary types would again give a range of equal depth. As a basis for selecting the reduced depth, the ranges dyed with 1/3, 1/6, 1/12 and 1/25 the dyestuff quantities of the 1/1 auxiliary types were used (Schwen, Eisele, Hafenrichter loc cit). In order to keep the corrections of this previously used range as low as possible the average depths of these ranges were calculated and taken as mean

$$\bar{\theta}_{1/3} = 6.00;\ \bar{\theta}_{1/6} = 5.03;$$

$$\bar{\theta}_{1/12} = 4.10;\ \bar{\theta}_{1/25} = 3.30$$

values for the ranges to be produced. The calculated values of the depth of shade Θ1/3 for the auxiliary types of the 1/3 range are derived from the values of the 1/1 auxiliary type range for each shade from the equation

$$\theta_{1/3} = 6.00/7.50\ \theta_{1/1}$$

The slight departure from Θ with the shade determined in the 1/1 range is thus taken over into the 1/3 range. The same procedure is adopted for the other ranges, the shades being dyed according to the calculated values. A maximum tolerance of ±1% of the calculated value is allowed. A visual evaluation of these ranges gave very good agreement in the depth of shade both over the whole range and also for the uniform color spacing of the ranges between themselves. In comparison with the ranges produced with 1/3, 1/6, 1/12 and 1/25 of the dyestuff uptake both properties appeared to be considerably improved.

The greatest disparity between the ranges calculated on depth and on quantity occurred in the 1/3, 1/6, 1/12 and 1/25 yellow and orange shades. While the quantitatively calculated shades were definitely too deep, those calculated on depth were judged to be somewhat too weak. Somewhat deeper shades were therefore selected by visual evaluation for the yellow and orange dyeings of the 1/3 auxiliary type range. The calculated depths of shade of these dyeings are about 3% above the average value of the 1/3 range and therefore about 7% higher than the values calculated from the 1/1 auxiliary types. It is quite possible that the yellow and orange shades of the 1/1 range are already somewhat too weak due to the well-known difficulties in evaluating the depth of shade in this color gamut. For the dyeing of the yellow and orange shades of the 1/6, 1/12 and 1/25 ranges dyeings of the 1/3 range were therefore used instead of the 1/1 dyeings. Fig 6 illustrates as an example the depth of shade of the finally selected 1/1, 1/3 and 1/12 auxiliary type ranges. These ranges with depths of shade reduced to 1/3, 1/6, 1/12 and 1/25 are also found to be of equal depth when estimated visually. With the aid of this formula it is therefore possible to dye any desired range of reduced depth in addition to the 1/1 auxiliary type range. Corresponding ranges have also been dyed on viscose and showed perfect agreement with the visual evaluation.

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(2) Godlove, *Am Dyestuff Reptr* **43**, 685-90, 696 (1954).

Western New England Section———

DYEING OF SYNTHETIC FIBERS— A DYER'S POTPOURRI*

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INTRODUCTION

WEBSTER'S New International Dictionary" defines a potpourri as "a medley or mixture." This talk certainly will be both, for I intend to cover a wide variety of fibers in a relatively short time, and to do so with a minimum of technical details so that this will be of interest to you who are not directly associated with the dyeing and finishing of synthetic fiber fabrics.

A twentieth-century Rip-Van-Winkle dyer awakening at this moment from his twenty-year sleep would be completely bewildered and befuddled in this modern world with so many new fibers. In 1937, before his long slumber, cotton, wool and silk were available as natural fibers. while rayon and acetate accounted for only 7% of the world's total fiber consumption. While called "synthetic" fibers then, these actually are chemically converted forms of cellulose, a natural polymer.

What a profusion of fibers have we seen introduced since that time! Nylon appeared in 1938, followed postwar (and perhaps not in the order given) by Dacron polyester fiber (*1*); the acrylic or modified acrylic fibers, Orlon, Acrilan, and the more recently announced Creslan and Verel; and Dynel, a vinyl fiber. Also recently have appeared Darlan, based on vinylidine dinitrile(*2*), and Zefran "nitrile alloy" (*3*). Teflon tetrafluoroethylene fiber becomes Du Pont's sixth commercial fiber. Polyethylene yarns (currently the most rapidly growing plastic) can be obtained from several suppliers.

In addition to these, mankind has further modified nature's polymers, as with Vicara from corn zein and Arnel cellulose triacetate. Modifications of the original nylon are now produced as "6" nylon under trademarks such as Caprolan and Nylenka.

We probably should pause for about ten seconds in honor of several commercial and experimental yarns not yet mentioned, and of the multitude of bulked, bulky and stretch yarns made from all these synthetic fibers.

However, let's discuss briefly the past and future growth of these synthetic fibers. In *Chemical and Engineering News*(*4*) of June 25, 1951, it was estimated that production of fully synthetic fibers (excludes rayon and acetate) would increase from 150 million pounds in 1950 to 500 million pounds in 1958, and to three-fourths to one billion pounds in 1960. This forecaster underestimated this industry's growth potential, for in a recent review(*5*) it is indicated that the 500 million-pound estimate given for 1958 had almost been met with the 465 million pounds produced in 1956. It is also indicated that there are now eleven manufacturers of the major synthetic fiber, nylon.

Total U S synthetic fiber production is, therefore just about equal to our domestic scoured wool consumption, estimated(*6*) for 1956 at 457 million pounds, of which 313 million pounds—68%—went into apparel uses, and 144 million pounds—32%—went into carpeting.

Incidentally, postwar U S wool consumption has varied from a high of 738 million pounds in 1946 to a low of 390 million pounds in 1954.

During the twenty-year period from 1937—1956, annual per capita fiber consumption in the U S has increased from 25 to 35 lbs or 40%(*7*). Based on population figures for 1955 and the 1955 Tariff Commission Report, Killheffer(*8*) has estimated that the annual per capita cost of dyes for synthetic-fiber fabrics is only $0.15, or 13.7% of the total dye cost per capita of $1.09, which is distributed as shown in Table I.

TABLE I
Annual distribution of dye cost per capita

Cotton and rayon	$0.42
Wool	.10
Synthetic fibers	.15
Textile printing	.14
Nontextile	.28
Total	$1.09

Imports of rabbit fur have been decreasing steadily due to efforts to exterminate rabbits in Australia and other countries(*9*). Imports for 1954 versus 1953 were as follows in millions of pounds:

	1953	1954
From Australia	2.7	1.0
From England	1.8	0.05

and the price increased from $3.60 to $8.00 a pound. From April to November of 1956 the price of fine-grade territory wool, scoured basis, increased from $1.28 to $1.53/lb or 20%, while Type 78 Australian wool had increased 27% in a year's time to $1.91 /lb, landed duty-paid at Boston(*6*). Clearly, with synthetic fibers selling considerably below these prices, an economic impetus will help accelerate their increased use in end-use fields formerly dominated by the natural fibers.

NEW EQUIPMENT AND PROCESSES

Prior to discussions of the more important synthetic fibers, I'd like to tell you briefly about a few of the newer processes and pieces of equipment developed in the U S and Europe for dyeing the synthetic fibers.

In a recent article(*10*), a novel process is described for continuous operations of scouring, bleaching and dyeing cotton, rayon, nylon, acetate and polyester fibers by a patented (*11*) electrical method. Electrical current is passed through the textile materials wet with a dilute solution of an electrolyte plus scouring and bleaching agents or dyes. Cost of electrical power is claimed to be not excessive. The process is known as Bates' Electrical Precision Dyeing, and is now applied to ribbons.

According to Fourness(*12*) the British Rayon Research Association is developing a modified Thermosol process in which fabrics padded with dye solutions or dispersions are exposed to a fluidized, heated, sand atmosphere to aid color fixation. This recalls the techniques of the petroleum industry for modern-day "cat" cracking plants.

* Presented before the Western New England Section on January 25, 1957. NOTE: A list of trademarks appears at the end of this paper.

At the Perkin Centennial the Chemstrand Corp announced its Chemnyle process (*13*), said to be "a new dyeing technique that brings to continuous filament nylon excellent color uniformity without sacrificing fastness." In a recent publication(*14*), it is claimed that improved levelness is based on:

1) Use of cationic agents including quaternary ammonium salts.
2) Selection of acid and direct dyes most suitable for level-dyeing nylon.

Previously, McGrew and Sharkey(*15*) had disclosed and/or claimed the use of cationic-active agents (such as alkaline earth salts; aliphatic, cycloaliphatic or aromatic ammonium ions, etc) for improved levelness of acid dyes on nylon, and MacGregor (*16*) had claimed cationic agents to be useful in applying direct dyes to nylon fabrics. Evaluation currently in progress in the trade will determine whether or not the Chemnyle process gives any better levelness in application of acid and direct dyes to nylon than the nonionic, anionic, and "carrier" type products recommended by others(*17, 18, 19*), who had indicated previously that proper selection of level-dyeing acid and direct dyes is of utmost importance. While improved fastness is inferred for the new process(*13, 20*), one of its developers states(*14*), "It should be pointed out that the Chemnyle process *per se* does not improve colorfastness but permits the application to filament nylon of many of those dyestuffs which normally have good fastness properties but which dye in nonuniform fashion."

The Du Pont Flowstock Process, announced on Dec 1, 1956, by J M Fletcher(*21*) before the South Central Section of the AATCC, was developed for continuous dyeing of textile staples such as cotton, rayon, nylon, wool, etc, or of nontextiles such as paper pulps. Commercial dyeing of such staples at the rate of 1000—3000 lbs per hour is forecast for this machine.

The Niptrol padder, introduced(*22*) to this country by the Rodney Hunt Machine Company, may make possible full-width continuous dyeing of carpeting made from wool, rayon, nylon and other fibers.

The Svetema Pad-Roll machine (*23*) developed by the A B Svenska Textilmaskinfabriken of Goteborg, Sweden, has been advertised recently in the U S. It has been promoted mostly for semi-continuous dyeing of cotton and rayon fabrics by padding, heating to dyeing temperature, followed by color fixation on the fabric while rotating on a beam in a housing heated to 160—205°F, depending on the fabric construction.

Equipment for high-temperature drying and dyeing continues under development in this country and in Europe. For piece-dyeing, the Burlington beam-dyeing machine has proved quite versatile and is the most widely used of the high-temperature machines in the U S(*24*).

Imperial Chemical Industries(*25*) has introduced the Vapacol Dyeing Process in England. This process was developed for continuous dyeing of acetate, triacetate and polyester fibers by padding an aqueous dispersion of disperse dye, drying the fabric, and developing the dye by exposure to trichlorethylene vapor at 185—186°F for about 30 seconds. We do not know whether or not this process is in commercial operation as yet.

DEVELOPMENTS CLASSIFIED BY SYNTHETIC FIBERS

Let's now turn to specific fibers and discuss the principal developments that have occurred during the latter part of 1956. We have noted that one of your members(*26*) has presented an excellent paper bringing us up-to-date to May of 1956.

NYLON———This continues volumewise as the most popular of the synthetic fibers (*5*); both Du Pont and Chemstrand recently have announced expansions or new plant construction to make more tire yarn. If announced plans materialize, the total U S production by mid-1958 will be about 450 million lbs per annum.

As most of you know, this will be based on two types of nylon, namely:

1) Nylon "66"—made from hexamethylene diamine and adipic acid.
2) Nylon "6"—made from caprolactam.

When in combination with nylon-66, the nylon-6 variety, due to its faster dyeing rate, will absorb more acid and direct dye than nylon-66. For this reason one must exercise more care in dyeing nylon-6 to get good levelness. Lightfastness of dyes is about the same on nylon-6 as on nylon-66; washfastness, particularly of the acid and direct dye types, is slightly inferior on the nylon-6 variety.

"Carrier" -dyeing of nylon filament fabrics has also been practiced to some extent(*19*) using swelling agents such as phenol, although the toxicity of phenol and problems connected with its disposal have hindered more widespread adoption.

Nylon fleeces (dyed with acid and neutral-dyeing premetalized dyes), some of which were developed in this district, continue to grow in popularity. While first made for interliners, some are now being put into reversible jackets.

Nylon continues to gain popularity in carpeting, being found in tufted and loop-pile constructions, and in velvets as well as hard twist yarns of the frieze or nubby varieties. The nylon can be dyed in stock, yarn, package and piece goods forms. Neutral-dyeing premetalized dyes are used with selected neutral-dyeing acid dyes to give a full-shade range having 40-80 hours lightfastness. Stock can be dyed either batchwise, by the continuous method using a wool-scouring train(*27*), or by the Du Pont Flowstock Process(*21*). Skeins can be dyed in Klauder-Weldon or Hussong machines. A recent development has been the "pack" dyeing of 100% nylon and nylon-wool skeins in the Hussong machine, thereby increasing capacity about three-fold over the "hang" method of dyeing(*28*).

Piece dyeing has been practiced extensively in large becks with reels 18 feet in width. Use of the Niptrol padder in conjunction with large steamers for pad-steam application offers considerable promise (*29*) for 100% nylon and nylon-wool blends.

You have all seen nylon in seat belts recently, either in 100% nylon or in nylon-rayon combinations. This is dyed either batchwise or by a continuous pad-steam process, using selected dyes and a swelling agent in the latter method.

Nylon finds more use in "stretch" yarns than any other fiber, and its use continues to expand. It is used extensively with cotton in blends where the nylon is dyed with neutral-dyeing premetalized and selected acid dyes, and the cotton is dyed with vat or direct dyes.

Garments made from bulked yarns, such as sweaters, are dyed in light shades with disperse dyes, and in medium to heavy shades with acid dyes.

Some but not all of the various stretch and bulk yarns have been described by end use, dye affinity, method of manufacture, etc (*1, p 16*). (*30*).

Textured yarns (Taslan, etc) also continue to grow in popularity (*32, 33*) and lately have been mentioned as a possibility for more absorbent nylon tricot in women's lingerie. Dyeing of these yarns and fabrics of

nylon can usually be done as for filament fabrics.

Improved specialty effects on nylon fabrics are being obtained by hot-roll embossing and Schreiner-calendering finishing treatments. We expect these to continue to increase in volume.

Nylon prints continue to be made with acid and direct dyes as well as with pigments. While discharge printing in the past has not been altogether satisfactory due to discoloration on aging of difficult-to-remove dye discharge products in the discharge pattern, recent results using neutral-dyeing premetalized dyes as a ground for discharge offers some possibility for improvement.

ORLON ACRYLIC FIBER AND ITS BLENDS —— This versatile fiber is offered in a broader denier spectrum than any other acrylic fiber as it is made in 1, 2, 3, 4-½, 6 and 10 deniers/fil. Therefore, it can be used satisfactorily in a variety of constructions, ranging from those with a cashmere-like hand to coarse woolen-type materials. Extremely bright shades are possible with fabrics of Orlon.

Of particular interest at this time is the whiter, more dyeable, Type 42 Orlon staple and tow currently being introduced to improve dyeing and finishing. Briefly, while dyeability of the new merge with disperse dyes is unchanged, the saturation value for cationic and basic dyes has been increased about 30%, and the speed of dyeing with cationic dyes is about 30% greater. Whiteness of the new merge has been substantially improved, so that it approaches the whiteness of the older merge after bleaching. Whiteness of the new merge can be improved further by bleaching with sodium chlorite.

One should find very little difference between the old and new merges as regards staining by acid or direct dyes, or effect of various finishing agents.

With the new merge it will be possible to get better results in deep shades such as hunter green, cordovan brown, maroon, navy, and black, particularly if one has difficulty in getting over 250°F in his dyeing equipment. If it has been difficult to obtain complete dye exhaust due to this temperature factor, it may be possible to save 10-15% of the cationic dye formula. However, if one has been getting a good dye exhaust, he will find his formulas on the new merge will be quite similar to those on the old.

Due to the increased exhaust rate of cationic dyes, it will be necessary to increase the quantities of retarder used about 50-75% to insure level dyeing, particularly in light shades.

While the whiteness and cationic dyeability of Orlon has been improving, new dyes and improved dyeing methods for this fiber have been created.

Leveling and Stripping of Cationic Dyes——Sweater dyers have found that better levelness can be obtained in some light shades (grays, tans) with cationic dyes than with disperse dyes. It is very important to scour first and drop the scour bath before dyeing so as to insure satisfactory levelness. Use of Glauber's salt and retarding agents with careful temperature control during dyeing are absolutely necessary for optimum levelness.

For best results in stripping for redyeing shades dyed with cationic dye types, a partial strip with sodium oleate followed by a sodium chlorite-nitric acid strip has proved most successful. Addition of oxalic acid to the latter formula may help improve the stripping action.

Dyeing Various Forms of Orlon Acrylic Fibers —— Considerable quantities of Orlon stock are still dyed. Use of the cuprous-ion dyeing method (US Patents 2,743,991-3, if applicable, are available for licensing from Union Carbide Corp) with acid dyes, except in a few heavy shades, has almost been eliminated by dyeing with the cationic dyes. Very little Orlon is now dyed in top form.

Considerable quantities of Orlon tow have been dyed in batch form for use in fancy two-tone garments of bulk Orlon. A continuous pad-steam process using ethylene carbonate as a swellant has been successfully demonstrated (*34*); heavy shades including black can be obtained by this process.

Dyers of staple or tow can use almost all of the cationic and regularly recommended basic dyes for dyeing at 225°F if required.

Orlon continues to lead the sweater parade and is now a staple item for women's "cashmere type" cardigans and pullovers, coat-sweaters, and the bulky knit fancies (ski sweaters, etc) made from dyed yarn or tow. It has started going into the men's sweater field, where coarser yarns are used.

Men's socks of Orlon, reinforced with nylon in the heel and toe, are unsurpassed for comfort and warmth, and are increasing in use.

Blankets of Orlon are increasing in popularity as they can be made in a good white and in all colors including bright shades, are light in weight and warm, washable (tumble dry), and mothproof.

These sweaters, half-hose and blankets are dyed in pastel shades with disperse dyes, while cationic types are used for light shades to black.

Fleece fabrics outstandingly popular with the ladies have been developed over the past three years or so from 100% Orlon knitted or woven fabrics, as well as from Orlon in combination with Dynel and other fibers. Styled to resemble natural fur, these fabrics are now being cut by fur cutters for fabrication into garments. These certainly are here to stay.

Beautiful Orlon-cotton and Orlon-rayon fabrics, about 80-20 blends, have recently appeared, as in 80-20 broadcloth and 80-20 Viyella-type flannel. These can be batch-dyed by conventional methods; research on continuous methods of dyeing is currently in progress.

Orlon-wool blends in 80/20 jersey fabrics continue in vogue. In wool blends, Orlon is outstanding over other acrylic fibers as it is more readily cross-dyed without staining of the Orlon, and does not suffer from "glazing" problems. Some beautiful men's wear fabrics of 65% Orlon-35% wool are now being introduced. In these the Orlon imparts comfort, durability and shape retention, while the wool imparts antistatic properties. These materials are piece-dyed by previously published methods (*35, 36*).

Fabrics of 80-20 Orlon-cotton blends can be printed using selected vat dyes with conventional print pastes and aging techniques. Cationic dyes can also be applied from a print paste containing 5% ethylene carbonate* with 5-minute steam aging. As the cotton is only slightly stained, the print is solid only if the blend is good.

DACRON POLYESTER FIBER ——An expansion in manufacturing facilities for this fiber is being made now to keep up with demands for it. Over the eight-year period since its introduction as Fiber V, this fiber has "accentuated its positive" in blends with wool, and, more recently, in outstanding "wash and wear" fabrics wherein it is blended with cotton, rayon or other fibers.

Several new dyes have been developed particularly for Dacron (*37*).

Sodium salt of o-phenylphenol continues to be a widely used carrier for Dacron. Avitone T softener and liquid, nonionic surfactants have been

*Effects (if any) of ethylene carbonate on humans are not completely known. Tests are underway.

widely used with this carrier to disperse the dyes, improve its emulsion stability, and to improve dye transfer and levelness.

A new carrier (*38*) has become increasingly popular. It finds most use in closed jig and reel dyeing of filament fabrics in medium-to-heavy shades, and for dyeing Dacron-wool blends. It need not be emulsified and does not spot, and can be used under different pH conditions.

Radiant heating units mounted vertically on a singer frame are giving much promise for "flash-heat-setting" of fabrics of Dacron and its blends. Exposure to high heat (1100-1200°F) for 3-4 seconds in these units has given as good results as obtained in conventional hot-roll or gas-fired heat-setting units in longer times at lower temperatures. Advantages (*39*) over the conventional units are said to include:

1) Less floor space
2) Considerably lower initial cost
3) Less equipment time
4) Minimum yellowing of wool in blends
5) Minimum dye sublimation.

Many fabrics containing Dacron are being subjected to resin-curing to improve "wash and wear" properties. Dyeing prior to resin-curing must be 100% complete so that the Thermosol action during the cure does not cause shades to develop "heavier" than standard.

Dacron polyester fiber and Mylar polyester film in decorative yarns are sometimes found in fabrics containing acetate or Arnel triacetate yarns that must be treated with antifume agents. As the latter often have a carrier action for dyes on polyester fiber or film, it is recommended that these agents be applied following dyeing rather than simultaneously, so that the decorative yarn will not be stained and the shade dulled.

As Dacron is going primarily into blends, most dyeing is done with this in mind. While considerable amounts of stock and top of Dacron are dyed, no large demand for dyed tow has developed.

Dacron has been dyed as such in yarn form in large quantity, and in yarns made from blends with other fibers. Elevated temperatures (250°F) are preferred by most dyers as no carrier is required.

Dacron-Wool Blends———You are familiar with the impact made in the men's summer suiting field of worsted fabrics containing at least 55% of Dacron. While some trade sources are stating that this blend will have 55% of the worsted summer suiting business in 1957, others state that this market will shrink some due to competition from Dacron-cotton or rayon blends in "wash and wear" suitings.

Many of the Dacron-wool fabrics are dyed satisfactorily in piece goods form. One large producer reports that his dye seconds are less than 1% of his total yardage, a remarkably low figure when it is recalled that this blend was unknown up to a few years ago. Both one-bath and two-bath methods are being used satisfactorily with the latter preferred, as untransferred disperse dye on the wool can be scoured off before the wool is dyed with acid or other dyes. Levy (16) 9 on 10x13 1-2 Textype . . Dyestuff Issued of JULY

Dacron-Cellulosic Fiber Blends———These are rapidly increasing in popularity as the "wash and wear" trend expands. Poplin raincoating fabrics of 50% Dacron and 50% cotton have been extremely popular during the past 3-4 years. Shirtings, suitings and dress goods are natural end-use fields for the 65/35 blends. Consumer satisfaction is base on

1) Proper construction for the end-use.
2) Satisfactory dyeing and finishing.

Large amounts of Dacron-cotton yarns have been package-dyed for sport shirtings and gingham or chambray dress goods. An increasing percentage of these fabrics is being piece-dyed, either by conventional one-or two-bath procedures (*38*), or by the Thermosol process.

Thermosol Dyeing———Introduced in 1949 (*40*), the Thermosol process of "heat-solution" dyeing has been commercially practiced only to a slight extent as it predated an outstanding need. Considerable development work (*41*) lately indicates this process has much to offer for continuous dyeing of blends of Dacron-cotton. With 65-35 blends, for example, the following general approaches can be taken with *good* blends:

1) Pastel shades——vat dyes on cotton by pad-steam dyeing
2) Light-to-medium shades—disperse dyes on Dacron by Thermosol technique
3) Medium-to-heavy shades—disperse dyes, Thermosol; vat dyes, pad-jig or pad-steam.

When properly blended, for example, it should be possible to dye 65-35 blends in womens' dress goods in pale shades of blue, pink, aqua, lilac, beige, etc, by method (1) above.

Certain disperse dyes have little tendency to vaporize at 400°F, and therefore can be recommended for Thermosol application.

It has been shown previously (*42*) that Dacron-wool blends can be Thermosol dyed. With the improved heat-setting technique described above, it is now possible to eliminate most all of the wool-yellowing during Thermosoling.

Proper finishing of Dacron polyester fiber blends is particularly important to achieve a satisfactory balance of the desired properties while eliminating undesired properties. Many finishers have worked with the Du Pont Textile Fibers Department for these goals, and are now advertising their particular finishing processes under trade names such as Chemsette, Valette (*43*), etc, indicating them to impart dimensional stability and crispness of hand together with antipilling properties.

Printing. Relatively little commercial printing of fabrics of Dacron has been practiced using substantive dyes, for the disperse types with best fastness require up to 15 psi steam pressure, which few printers can attain. Resin-bonded pigments are used extensively on fabrics of Dacron and Dacron-cotton blends.

OTHER ACRYLIC, MODIFIED ACRYLIC AND VINYL FIBERS

ACRILAN———Acrilan can be dyed with more classes of dyes than any other acrylic fiber on the market today. While this allows the dyer somewhat more versatility, at the same time it causes problems, for in blends the Acrilan will be stained and the shade dulled. Development of the cationic dye types has materially improved the brightness of the shades possible, and the fastness properties of these shades. A recent review (*44*) contains recommendations for a number of ladies'- and men's-wear shades. Usually, for good fastness, disperse and cationic dye types are used for light-to-medium shades; acid and metalized acid types for medium to heavy shades; and chrome dyes for the deepest shades. Recommendations for sweater (*45*) and jersey (*46*) shades have been developed.

Methods for dyeing Acrilan-wool blends are available (*44, 47, 48*). The most recent approach to this task (*48*) is based on use of an acid pretreatment and a cationic reserve to obtain union shades with the same dyes on each fiber.

DYNEL———Production of Dynel, while substantial, has not increased as rapidly as that of Orlon. It can be dyed (*47*) with disperse, acid, neutral-dyeing premetalized and basic dyes. The cuprous-ion technique (*50*) is used for application of acid dyes, alone and in combination with disperse dyes. The o- and p-phenylphenols are used as carriers in medium to heavy shades. Neutral-dyeing premetalized dyes are recommended for best lightfastness.

VEREL———Verel is said to be outstanding in its flame resistance (*51*). It is dyed (*52*) with

1) Neutral-dyeing premetalized dyes, which give good lightfastness and washfastness of 140°F or better;
2) Disperse dyes, which give better brightness than the neutral-dyeing premetalized dyes but with poorer fastness properties.
3) Cationic dyes, which give the brightest shades, but, according to Eastman, have poor lightfastness. We have found, however, that when they are applied at 180°F without a retarder, deep shades can be made having good lightfastness (*53*).

As it appears that the Verel dyeing assistant will be necessary to obtain heavy shades using neutral-dyeing, premetalized acid, or disperse dyes, the cationic dyes will undoubtedly be promoted for use on Verel.

CRESLAN———Creslan is scheduled for commercial production in late 1957 (*3*). Like Acrilan, it will be dyeable with many color classes, such as direct, developed, acid, basic, milling, metalized acid, and disperse dyes. Basic dyeing sites are present to give substantivity to dyes containing acid radicals.

ZEFRAN———Zefran "nitrile alloy" will be made in commercial quantities in early 1958 at the Dow plant now under construction at Lee Hall, Virginia. This fiber (*54*) is listed here with the acrylic fibers, as it is probably a modified type, although its composition has not been announced (*3*). Dow states that Zefran will combine the ease-of-care properties of synthetic fibers with the dyeability of the cellulosic fibers, as vat, direct, aftertreated direct and neutral-dyeing premetalized dyes have affinity for this fiber. The manufacturer claims an interesting set of properties, including: good whiteness, durability to wear and destructive agents, low pilling propensity and good thermal stability.

DARLAN———Darlan is described as a dinitrile fiber made from vinylidene dinitrile. Plans for large-scale production have not yet been announced, but very acceptable fur-like fabrics for deep-pile women's coatings have been made, as well as fine woolen blends for suitings, hand-knitting yarns, etc. It is said (*2*) to be dyed in light shades with disperse dyes without a carrier, and in medium to heavy shades with disperse and cationic dyes using a carrier.

SARAN———Saran is a copolymer of vinylidene and vinyl chlorides (*1*) which can be dyed with disperse dyes (*55*) at 200°F. A number of disperse dyes developed for acetate are recommended, and also several of the disperse dyes made for polyester fibers.

CONVERTED NATURAL POLYMERS

VICARA———Vicara, made by wet spinning of corn zein solutions, can be bleached to a fairly good white and dyed with a number of dye classes. Due to its low abrasion resistance, it is usually blended with wool or nylon and dyed (*56*) with neutral-dyeing or weakly acid-dyeing types. More recently the dyeing of Orlon-Vicara blends has been described (*57*) using cationic dyes for the Orlon and acid or chrome dyes for the Vicara. Formulas for a number of shades are given.

OTHERS———Both secondary acetate and the more recently introduced triacetate fibers (such as Arnel) have benefitted by the development of the disperse dyes for polyester fibers, for considerably improved lightfastness is possible with these types (*58*). Dyeing of Arnel triacetate is covered in an AATCC prize-winning paper (*59*) and in other papers (*60, 61*).

Developments in the viscose and cuprammonium rayon fields nave not been as spectacular in recent months as with the true synthetics.

COLOR - SEALED YARNS——— About 3-4 years ago the Eastman Chromespun acetate yarns were introduced. In the interim other acetate suppliers likewise have marketed dope-dyed acetate yarns, and the trend has spread into the rayon field, where both filament and spun forms are available. Solution-dyed yarns are made also of other fibers (nylon, Orlon, Saran, Fortisan), but in a much more limited shade range.

NONWOVEN FABRICS

This subject has considerable interest to two groups in this section, those of you who dye hats in Connecticut, and others "north of the border" in Massachusetts to whom these brief remarks are addressed.

Nonwoven fabrics in the US (bonded fiber fabrics in England) increased in volume from 25 millions lbs in 1953 to about 60 million lbs in 1955 with 8 suppliers. These are made from cotton and/or rayon, alone or in blends with synthetic fibers, using bonding agents to obtain strength and dimensional stability. These are invading fields formerly held securely by woven or knitted textiles; for example, Pellon half-slips which compete with nylon "horsehairs" and cotton crinolines.

Nonwoven fabrics are colored by

1) putting pigments in the bonding agents,
2) dyeing the bonded fabrics, or
3) using dope-dyed fibers to make the fabric.

An excellent review of this field was presented during the Perkin Centennial (*62*).

ACKNOWLEDGMENT

Much of what has been presented has been developed by my colleagues in the Dyes and Chemicals Division and The Textile Fibers Department of the Du Pont Company. To them I give my thanks for permission to talk about their developments, and also for their help in obtaining the exhibits you have seen tonight.

TRADEMARKS

Acrilan—The Chemstrand Corp
Arnel—Celanese Corp of America
Avitone—E I du Pont de Nemours & Co, Inc.
Caprolan—Allied Chemical & Dye Corp
Chemsette—Defiance Bleachery
Chrom spun—Eastman Chemical Products, Inc
Creslan—American Cyanamid Co
Dacron—E I du Pont de Nemours & Co, Inc
Darlan—B F Goodrich Chemical Co
Dynel—Union Carbide Corp
Fortisan—Celanese Corp of America
Mylar—E I du Pont de Nemours & Co, Inc
Niptrol—Rodney Hunt Machine Co.
Nylenka—American Enka Corp
Orlon—E I du Pont de Nemours & Co, Inc
Taslan—E I du Pont de Nemours & Co, Inc
Teflon—E I du Pont de Nemours & Co, Inc
Verel—Eastman Chemical Products, Inc
Valette—Robertson Bleachery & Dye Works
Vicara—Virginia-Carolina Chemical Corp
Zefran—The Dow Chemical Co

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ACTIVITIES OF THE LOCAL SECTIONS

Pacific Northwest

THE 1957 Spring Meeting of the Pacific Northwest Section was held at the Aero Club, Portland, Ore, on April 26th with thirty members and seven guests in attendance. The meeting was preceded by a cocktail hour and steak dinner.

In accordance with the decision made at the November, 1956 meeting to introduce occasionally subjects and activities outside the textile field at Section meetings, those in attendance heard guest speaker Rep Clarence Barton, speaker of the House of Representatives of the state of Oregon and chairman of the House Committee on Taxation. With Rep Barton were Rep Richard Eyman, vice chairman of the House Committee on Taxation, and Rep Guy Jonas.

The fact that the Oregon state legislature was in session at the time and House Bill 796 on taxation was being debated brought out to the meeting executives from local mills who do not normally attend Section meetings. Among those present were presidents and vice presidents from Pendleton Woolen, Oregon Worsted, Portland Woolen, Jefferson Woolen and Thos Kay. Tax consultants from some of these firms also were in attendance. A question-and-answer period followed Mr Barton's Address.

The Section will hold its annual outing August 3 at the Mt Hood Golf Course, Welches, Ore.

Western New England

THE 10th Annual Outing of the Western New England Section was held on Friday, June 14, 1957 at the Wallingford Country Club, Wallingford, Conn.

Approximately 75 members and guests enjoyed a fine day of golf and other sporting events.

Alfred J Gondyke, National Aniline Div, Allied Chemical Dye Corp, took low gross honors in golf with a two-stroke advantage over R P Fraser, American Felt Co. Other winners of the various golfing events were: *low net*—R T Eklund, Bigelow-Sanford Carpet Co; *lowest total putts*—Al Rant, Laurel Soap Mfg Co, and L C Batdorf, Princeton Knitting Mills, Inc; *blind high hole*—W J Curtin, Naugatuck Chemical Div; *blind low hole*—A W Goodwin, Princeton Knitting Mills, Inc; *putting*—P W Reeves, Princeton Knitting Mills, Inc.

Honors in horseshoes went to B Fitzgerald and Stan Hoffman of the Hat Corp of America. Bernard Lustig, Lawrence Richard Bruce, Inc, continued to reign as champion of the chess board.

Door prizes were awarded to everyone attending dinner, which was presided over by Section chairman Thomas J Gillick, Jr, American Felt Co. Prizes were distributed by Jim House, Princeton Knitting Mills, Inc. outing chairman, and Peter DuBiel, Cheney Bros, Inc, WNE treasurer.

New York

THE annual outing and golf tournament of the New York Section was held on Friday, June 21, 1957 at the North Jersey Country Club, Preakness, NJ.

Chairman of the outing was Chris W Farrell, Althouse Chemical Co. Committee members were Eugene J Grady and Michael F Costello, Jacques Wolf & Co; Richard P Monsaert, Jr, Puritan Piece Dye Works; Hugh J Bonino, Metro-Atlantic, Inc; Gerard Heine, American Aniline Products, Inc; Robert F Holoch, National Aniline Div; and Dimitry G Zachary, American Cyanamid Co.

The outing was one of the largest ever sponsored by the New York Section. Attendance was 410 with over 200 persons playing golf.

Winners of the various golfing events were as follows:

Low gross (member)—Robert W Brewer, American Aniline Products, Inc, first; John W Immerman, Hudson Piece Dye Works, Inc, second; Hugh J Bonino, third; Robert L Stutz, Better Fabrics Testing Bureau, Inc and Anthony Martone, tied for fourth.

Low gross (nonmember)—J Van Kleek.

Low net—Albert E Johnson, National Institute of Drycleaning, and Mike Halpern, tied for first; LeRoy R Hamilton, Interchemical Corp, Arsene J Berube, Royce Chemical Co, and William Dollan, tied for third.

Putting—Chris W Farrell, first; Joseph S Lange, retired, and Harry G Kennedy, Metro-Atlantic, Inc, tied for second.

Hole-in-one contest—Ed Kelly, first; Jules J Devigne, Interchemical Corp, second.

Marvin Klapper took top honors in horseshoes with Joseph H McKenna, Eureka Printing Co, second.

The Martin Weiner Award for the outstanding printed sport shirt was awarded to Michael Costello.

Donald E Marnon, chairman of the Section, presented P J Wood, Royce Chemical Co, a gift certificate in honor of his being named to receive the 1957 Olney Medal Award at the Boston Convention. It was also announced that Mr Wood was celebrating his 77th birthday and with this the members and guests gave him a spontaneous demonstration of good will and birthday greetings.

1957 DELAWARE VALLEY SECTION OUTING

Registration. (L to r); Tom Holst, General Latex Co; Ernst W Empting, Verona Dyestuffs, secretary of the Delaware Valley Section; Boyce C Bond, Metro-Atlantic, Inc; Ed Haack, General Dyestuff Co; Richard C Kopp, Aberfoyle, Inc, and Ange E Raimo, John Campbell & Co, Inc, outing chairman.

A Carter Fergusson, Alex C Fergusson Co (center) is presented with the trophy for low gross by Jack Adams, Calgon Inc, golf chairman, as Chairman Don Robinson looks on.

(L to r): Nevin Breenawalt, Wolf Dye & Bleach Co; H Higginbotham, Leatex Chemical Co; Wallen Fisher, Wm G Leininger Knitting Co; Charles Schappell, Wolf Dye & Bleach Co; Ben Holst, Philadelphia QM.

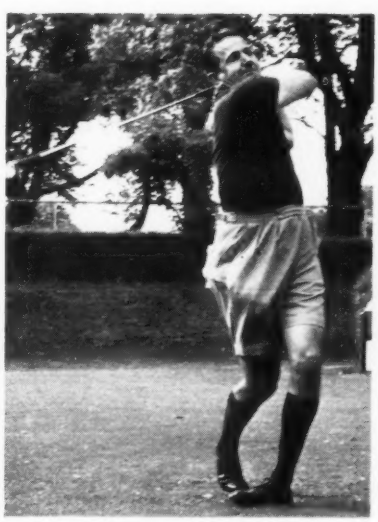
George Molloy, George W Bollman Co, (center) is presented with the low net golf trophy by golf chairman Jack Adams. Looking on (l to r) are Bertrand W Hayward, president, Philadelphia Textile Institute; Chairman Don Robinson and Outing Chairman Ange E Raimo.

Checking on scorer Don Robinson's arithmetic prowess are (l to r): Clarence A Seibert, Scholler Bros; Charles Duddy; and Jim Rishton.

The pause that refreshes! (L to r); Bill Bertolet, Laurel Soap Co; R Hughes, Union Carbide Chemicals Co; T Hamilton, Union Carbide Chemicals Co.

(L to r): Past chairman Tom Hart, Hart Products, Inc, discusses the '57 Outing with Arthur M Gordon, J B Martin Co, and Ange E Raimo, outing chairman.

(L to r): Quoitsmen Bill Myers, Frankford Woolen Co; Buck Harvey, *Textile World*; John McFarlane, American Cyanamid Co; and Robert F Graupner, Scholler Bros.



Donald W Robinson, Para-Chem, Inc, chairman of the Delaware Valley Section, is among the first to tee off.

Harold De Turck (center) and David Ketner of Berkshire Knitting Mills have caddie Tom Walsh carry their heavy artillery to the first tee.

Finishes and Blends Form the Future———

(*Concluded from page P503*)

strength than the resin-treated all-cotton. Of course, the more rayon present, the better the luster, and in many cases the need for the mercerizing step is eliminated. Then too, cotton-and-rayon blends can be given sharper embossing as well as improved napped surfaces compared with the 100% cotton. All of these summed up present a good case pointing towards increased pounds of cotton-and-rayon blends for the future.

EFFECT OF FINISH———Colorspun rayon can add to the fastness of washable items. The best vat-dyed cotton piece goods do not show the fastness to laundering shown by Colorspun rayon. By way of illustration, samples of the following are shown here for your inspection.

First of all is a Colorspun navy blue rayon challis. Next is the same fabric treated with acid formaldehyde and cellulose ether. Next is a piece of a somewhat lighter blue piece-dyed cotton purchased as the fastest dyeing in a blue shade in a very large department store. The cotton sample has been washed three times in a commercial wash wheel in a high alkaline commercial wash formula. It shows considerable loss of color at all the seams and even some color loss over the face of the fabric. I would say that the color had lost its usefulness. The rayon samples have been washed with the cotton sample and then continued on for a total of ten washes. At three washes the rayons show no effect of the strong wash and after ten, although the unfinished sample shows glazing on the edges, the color is still true to the original Colorspun shade. The value of finishing is seen in the CEF-treated Colorspun, which retains its original dimensions and color, and shows no glazing after the ten washing cycles.

CONCLUSION

Look for more and more blends for finishing, particularly with rayon, because rayon provides low cost and low waste factors, a tailored staple length and denier sizes, a series of physical properties engineered for blending, and freedom from static problems. With regard to finishing itself, rayon provides a base fiber which will accept more internal resin or reactant than any other fiber commercially available. Rayon is a white fiber with exceptional affinity for a full range of shades of dyes as well as offering Colorspun fastness for precolored yarns. All these properties work towards rayon as the number one fiber for blends for the future.

ACKNOWLEDGEMENT

Appreciation is expressed to Irvin H Welch and others of the Dyeing and Finishing Division of the American Viscose Corporation for the preparation of many samples and example of finished fabrics and garments.

NOTICE TO SECTION OFFICIALS

To ensure that the activities of your Section receive proper publicity in the *Proceedings*, it is desirable that material be submitted direct to American Dyestuff Reporter, 44 E 23rd St, New York 10, N Y.

ADVANCE NOTICES OF MEETINGS———Copy must be submitted *at least two weeks* prior to the publication date. ADR is published on alternate Mondays. It is urged that these dates be taken into consideration when copy is submitted.

Advance notices should include the date and site of the meeting; the speaker's name, position, business affiliation, and subject; a short abstract of the paper (optional); details of additional meeting highlights, eg, nominations or election of officers, special awards, activities of Sectional committees, etc.

MEETING REPORTS———Complete reports should be submitted as soon as practical after a meeting. Information should include attendance figures; captioned photographs of meeting principals (speaker, section officials, etc); and any additional points not covered in the advance notice. An extensive resume of the speakers' remarks is not necessary if the paper is to be submitted for full publication in the *Proceedings*.

PAPERS———Two copies of each paper presented before local sections should be sent to the offices of the American Dyestuff Reporter. It is very important that every speaker be acquainted with the "Notice to Authors", which appears periodically in the *Proceedings*. Additional copies of said notice will be sent to section officials on request.

It is imperative that each Section appoint an official whose responsibility it is to see that the speaker's remarks are submitted. In cases where prepared manuscripts are not immediately available to the Section official, it may be necessary to acquaint the author with the address to which he should send his material when it is finally prepared.

In cases where the material is extemporaneous (panel discussions, question-and-answer periods, open forum, etc) it is the responsibility of the Section to provide for stenotype service, so that a complete record may be available.

PRESENTATION OF A PAPER BEFORE A LOCAL SECTION DOES NOT GUARANTEE PUBLICATION IN THE PROCEEDINGS, AS THE FINAL DECISION RESTS WITH THE AATCC PUBLICATIONS COMMITTEE. However, most papers will be acceptable provided they conform in content and layout to established practices of AATCC.

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John J Toon

AATCC Calendar

COUNCIL

Nov 14 (Lowell Technological Institute, Lowell, Mass); Jan 24 (New York, NY); May 23 (Philadelphia, Pa); Sept 19, 1958 (Piedmont area)

NATIONAL CONVENTIONS

Nov 14-16, 1957 (Hotel Statler, Boston); Oct 30-Nov 2, 1958 (Hotel Conrad Hilton, Chicago); 1959 (Sheraton Park and Shoreham Hotels, Washington, DC); Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa) September 28-30, 1961 (Buffalo, NY)

DELAWARE VALLEY SECTION

Sept 27 (Joint meeting with New York Section at Hotel Hildebrecht, Trenton, NJ); Nov 1 (Kugler's Restaurant, Philadelphia, Pa); Dec 6 (Kugler's Restaraunt, Philadelphia, Pa)

MID-WEST SECTION

October 26 (Bismarck Hotel, Chicago, Ill)

NEW YORK SECTION

Sept 27 (Joint meeting with Delaware Valley Section at Hotel Hildebrecht, Trenton, NJ)

NIAGARA FRONTIER SECTION

Sept 27 (Buffalo); Oct 25 (Joint meeting with CATCC Ontario Section at St Catherines, Ont); Dec 6, Feb 21 (Buffalo); Apr 4 (Joint meeting)

NORTHERN NEW ENGLAND SECTION

Sept 13 (Outing—Wachusett Country Club, W Boylston, Mass); Dec 6 (Annual meeting, Hotel Continental, Cambridge, Mass)

PACIFIC NORTHWEST

August 3 (Annual Outing, Mt Hood Golf Club, Welches, Ore)

PIEDMONT SECTION

Sept 27-28 (Annual Meeting—Hotel Barringer, Charlotte, NC)

RHODE ISLAND SECTION

Sept 27 (Ladies Night—Narragansett Hotel, Providence, RI); Oct 24 (Providence Engineering Society, Providence, RI); Dec 5 (Annual Meeting—Johnson's Hummocks Grill, Providence, RI)

SOUTH CENTRAL SECTION

Sept 20 (Hotel Patton, Chattanooga, Tenn)

SOUTHEASTERN SECTION

Sept 14 (Harmony Club, Columbus, Ga); Dec 7 (Dinkler Plaza Hotel, Atlanta, Ga)

WESTERN NEW ENGLAND SECTION

Sept 27 (Rapp's Restaurant, Shelton Conn); Nov 1 (Annual meeting, Hartford, Conn, area); Dec 13 (Rapp's Restaurant, Shelton, Conn)

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

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News of the Trade

Butterworth Expands Textile Machine Research and Development

H W Butterworth & Sons Company, Bethayres, Pa, has announced an accelerated program of research and development in the field of new machinery for the textile wet processing industry.

Butterworth, a division of Van Norman Industries, has indicated that its current research program includes an emphasis on new methods of dyeing, bleaching and washing. The program also includes adapting many foreign patents for use in the American market. During 1957, the firm reportedly will invest a total of about $250,000 in research and development of new textile finishing processes and equipment.

Among standard products in the Butterworth line are 84 diversified machines for such functions as dyeing, bleaching, drying and finishing for the textile idustry, and spinning and processing machines for the makers of synthetic fibers.

Research, manufacturing and development facilities at the Butterworth plant also have been greatly expanded. A five-year, million-dollar re-equipment program is in full swing.

Price Reduction on Dow Chelating Agents

Reduction of prices on all liquid bulk shipments of Versene and Versenol chelating agents, ranging from ½ to 3½ cents a pound, has been announced by The Dow Chemical Company. The new prices became effective June 14.

Dow is making a realignment of its prices in accord with the relative efficiency of its various chelation products. Versene 100 (ethylenediaminetetraacetic acid, tetrasodium salt solution is reduced from 22 to 19 cents a pound in carload quantities. Versene 67, a less concentrated form of the same solution, has been reduced from 18½ to 17 cents. Versene Fe-3 liquid, a product primarily for iron control in textiles and synthetic rubber, is reduced from 18 to 17 cents.

On these products and on other liquid chelating agents in the Dow line, an additional price reduction of ½ cent a pound is provided in tank car and tank truck quantities.

1st International Clothing Materials Mart

The first international clothing materials mart is being held this week in Milan, Italy. Primary object of the event, according to Pietro F Mignone, Italian Commercial Consul in New York, "is to foster international trade relations in the field of textiles for the clothing industry in a professional atmosphere, and to sum up twice annually a synthesis of all novelties produced in the field of clothing textiles on an international basis."

CCNE Elects New Officers

The Chemical Club of New England Inc recently held its annual meeting and election of officers in Boston, Massachusetts. John E Upham Jr was elected president for the 1957-58 year. He presently is technical sales representative in New England for the Cellulose Products Division of Hercules Powder Co.

Other club officers elected were: Irving G Loxley, Heyden Newport Chemical Corp, *vice president;* Seth U Shorey, Monsanto Chemical Co, *treasurer,* and T Fred Baker Jr, Fritzsche Bros Inc, *secretary.*

The Chemical Club of New England was founded in 1946. Among its varied activities is the sponsorship each year in New England of "Chemical Progress Week" and the establishment of an increasing number of chemical scholarships.

The Spring Outing of the club and its guests was held on June 6th at the Warwick Country Club, Warwick, R I.

NSP Signs Lease for New Quarters in NY

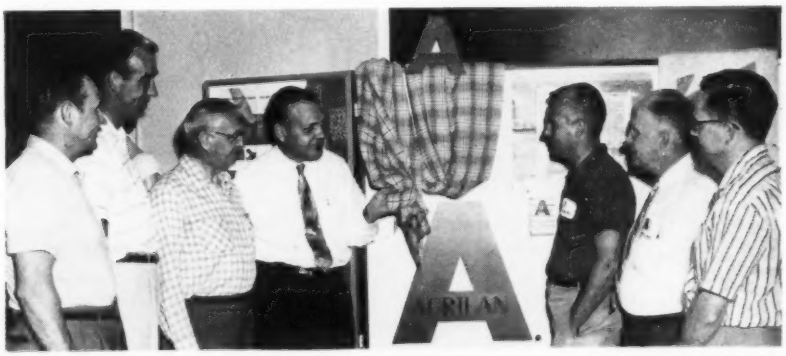
National Starch Products Inc has signed a long-term lease for the entire 13th floor of the building now under constructioin by Uris Bros at 750 Third Avenue, New York. The new space will be occupied as executive and administrative offices, according to Donald D Pascal, executive vice president.

Occupancy is scheduled for May of 1958. Mr Pascal stated that the accelerated growth and diversified expansion of the company necessitate this move to larger quarters. Present offices are at 270 Madison Avenue.

Ground Broken for LTI's Industrial Research Bldg

Gov Foster Furcolo broke ground for the new $2,108,000 Industrial Research Building at Lowell Technological Institute at 59th commencement exercises last month. The building, which will house research facilities, classrooms, and laboratories for the plastics and electronic engineering courses, is expected to be ready for occupancy by September, 1958.

Among those participating in the ground-breaking ceremony were President Martin J Lydon; Samuel Pinanski, chairman of the board of trustees; and Hall Nichols, director of the Mass Division of Building Construction.



Shown on tour is the second of two groups of textile educators to visit the Chemstrand Corporation as guests of the Research and Development Division. The purpose of the visit was to give the educators a first-hand knowledge of Chemstrand's two products, Acrilan and Chemstrand nylon, and of the company's research and development operations as possible subjects for their curriculums.

Pictured, left to right, are L E Parsons, Texas Technological College; Dorrance Goodwin, Lowell Technological Institute; Carl Medde, Bradford Durfee Technical Institute; S J Davis, Chemstrand assistant director of fiber research; Henry Morgan, Massachusetts Institute of Technology; Hugh M Brown, Clemson College; and William Martin, Institute of Textile Technology.

Union Carbide to Build Major Production Plant

Another major chemicals plant is to be built by Union Carbide Corp in Putnam County, W Va, according to a recent announcement by Morse G Dial, president. The new facilities will produce large volumes of basic chemical products.

The new plant, to be completed in 1960, will be the eighth major chemicals producing plant of the Company. D B Benedict, president of Union Carbide Chemicals Co, Division of Union Carbide Corp, which will operate the plant, commenting on the new venture, said: "We already have two major plants for the production of organic chemicals in this region. The new facilities will produce chemicals for the market and supply raw materials for further processing at the South Charleston and Institute plants."

"The new plant," explained Mr Benedict, "is required to meet the growth of Carbide's activities in every direction. It will provide additional ethylene and propylene, which are the raw materials for most of Carbide's chemicals. The plant will be designed for the greatest possible flexibility to meet changes in the market demands for chemicals as they occur in the future. Three of the more important chemicals to be made at this plant are ethanol, ethylene oxide, and isopropanol."

The plant site is on the south bank of the Kanawha River, near the town of Winfield, county seat of Putnam County. The river provides process water for steam and cooling. Suitable dock installations will make possible the fullest use of water transportation.

When completed, the new plant will employ about 500 people. During construction of the plant, 1,000 men will be employed over the two year period that the building job will be in progress with a payroll of more than $100,000 per week.

Citation Honoring 1st Godlove Award Recipient

The March issue of the *Inter-Society Color Council News Letter* announced that Deane B Judd had been named the recipient of the first Godlove award.

The citation honoring the first recipient is reprinted herewith.

"Mr President:

"On August 14, 1954, the Inter-Society Color Council suffered a great loss in the passing of Dr I H Godlove. Many are the sorrowing friends of Dr Godlove; they mourn him as a man of science, a man of vision, a man of open mind—a kindly man of open heart. He served the Council with perseverence and devotion as its chairman, as editor of its News Letter for sixteen years, and as a member of many committees, to all of which he contributed freely of his time and his talents. We shall remember him always with affection and admiration!

"Last year the Inter-Society Color Council accepted a fund established by Mrs I H Godlove, to provide for a Godlove Award, to be presented biennially to a person selected for outstanding contribution to the knowledge of color. To select the first recipient, Mr President, you appointed a committee, consisting of Miss Dorothy Nnckerson, Dr E I Stearns, and myself, as chairman. It is now my privilege to report our recommendation to you. It was an easy task to make this selection, for there was one name that came first and promptly to each of us, that of Deane Brewster Judd, National Bureau of Standards, Washington, D C.

"In recommending Dr Judd to be the first recipient of the "Godlove Award for Contributions to the Knowledge of Color," we take pride in naming a man, who as past chairman of the Council—the only chairman to serve two terms—has contributed significantly to fulfilling the aims and purposes of the Inter-Society Color Council by stimulating and coordinating the work of our various Member Bodies "leading to the standardization, description and specification of color and promoting the practical applications of these results to the color problems arising in Science, Art, and Industry." In 1954-55 he served with distinction as president of the Optical Society of America.

"We honor him for his genius in probing the secrets of nature to bring into focus, through clear and precise language, both words and numbers, the intricate relations which in the subject of color unite physics, chemistry, physiology, and psychology. His extensive publications comprise more than one hundred research papers, innumerable reports, and his book: *Color in Business, Science and Industry.*

"Time does not permit us to enumerate separately and completely all of his contributions to the fund of color knowledge. A complete bibliography—or one we believe to be complete—is appended to this citation as proof of his vigorous productivity. We wish, however, to mention a few of the broad subjects where his scientific insight has illuminated the path for all of us: the standard observer for colorimetry; anomalies of color vision; light scattering properties of materials; chromatic adaptation; uniform color scales; color names; evaluation of color differences, including color tolerances and an index of whiteness.

"We recognize his eminence as Director of the Technical Secretariat on Colorimetry of the International Commission on Illumination. No scientist has served in the sphere of international relations in color with greater distinction. Always he has stood firmly for the point of view of American workers in color where he thought it right, and he has been able to draw a sympathetic understanding and respect even from those who may not have agreed with him. Prudent and alert, ever vigilant and masterful, he has exhibited at international meetings the wise leadership of a first-rate diplomat as well as of a scientist and patriot. He comes to us at this meeting fresh from four months in Madrid where for the third time since 1949 he has gone at the invitation of the Instituto de Optica "Daza de Valdes," this time as visiting professor.

"Two summers ago, while in Holland, a graduate student in the University of Utrecht told me that as a rule all physicists can be divided into three groups: mathematical, theoretical, and experimental. A mathematical physicist can calculate everything but he understands nothing and can do nothing. A theoretical physicist can calculate nothing, understands everything and still can do nothing. And finally, an experimental physicist can calculate nothing, understands nothing, but can do everything.

"If this be a rule, Dr Judd is the exception. We think of him as a physicist in color who can calculate everything, understand everything, and to boot, do everything.

"During most of his life-span, Dr Judd has followed the rainbow, but not to look for the mythical pot of gold at its end. All along that path he has made a legion of friends who esteem him and are proud to know him. Mr President, we recommend to you our unanimous choice as the first recipient of the Godlove Award of the Inter-Society Color Council, Dr Deane Brewster Judd!"

Isay Balinkin, Chairman
Committee to Select Recipient
for 1957 Godlove Award

Skeist & Schwarz Form New Firm

An expanded and coordinated consulting service for the textile and plastics industries is now offered by Eugene W K Schwarz and Irving Skeist. Their laboratories will be consolidated as Skeist & Schwarz Laboratories, Inc, 89 Lincoln Park, Newark 2, N J.

Dr Schwarz, president of the new firm, is prominent as a consultant in fiber development, dyeing and textile processing technology. Dr Skeist, vice president, is a polymerization and plastics specialist.

The new organization provides more extensive facilities for sponsored research, advisory consulting, economic and marketing surveys in the fields of polymer-textile chemistry. This plastics-textile alliance is expected to be especially valuable in such overlapping and related fields as polymer synthesis, synthetic fibers, textile processing and surfactants, textile and paper coating, nonwoven and bonded structures, reinforced plastics, plastic film and foam.

Role of Textile Engineer Debated at 65th ASEE Meeting

The role of the textile engineer in industry as well as the need for such a separate and distinct classification of engineering was the subject of considerable debate at the textile committee panel held at Cornell University in connection with the 65th annual meeting of the American Society for Engineering Education.

Martin J Lydon, president of Lowell Technological Institute, presided as moderator of the panel as well as the open discussion from the floor that followed.

Participants emphasized the increasing necessity for a heavier concentration on the basic scientific and engineering subjects in textile engineering curricula. This, it was agreed, will have to be at the expense of some of the applied textile subjects.

Major reasons given for this revision were the tremendous technological developments in the last few years in machines, processes and controls and the certainty that the pace of such changes would accelerate rapidly in the future. It was felt that the teaching of present techniques, many of which would be obsolete within a few years, must give way to the intensive study of fundamentals and the development of an analytical, research-minded engineer capable of coping with the, as yet, unknown problems of the future.

The coming development of "engineered" fabrics which are designed by mathematical and scientific principles in advance rather than the older empirical approach was also cited in connection with the necessity for curriculum revision.

Most of the panel agreed that the textile student must be fully trained in engineering and the natural sciences before he applies these to the analytic solution of the problems of the textile field.

Many speakers stressed the necessity of some training in marketing, management and costing for the textile engineer. Rapidly changing consumer wants must be translated into design and production almost overnight in a highly competitive price-sensitive field. The textile engineer must have a broad background and be flexible and alert enough to adjust quickly to changes as in almost no other industry.

The need for the separate classification of textile engineer was lively debated. It was agreed that the textile industry was in many respects unique. Its raw materials, fibers, are unlike any other engineering materials such as liquids or relatively large-scale solids. The great number of processes through which they pass and the almost infinite combinations of those processes to produce a limitless number of end products make it necessary for a specialized engineer, trained in this field, to be of maximum value to industry. It was felt that other engineers entering the industry had to be trained on the specific job and rarely got the breadth of textile operations necessary for greatest advancement.

The panel members included A G Ashcroft, Arthur D Little, Inc; H F Schiefer, National Bureau of Standards; Stanley Backer, MIT; Charles F Edlund, Lowell Technological Institute; and Jules Labarthe, Jr, Mellon Institute of Industrial Research.

PTI Seminars

Philadelphia Textile Institute was the site of two recent seminars of interest to the industry.

A five-day seminar entitled "Textiles Today", sponsored by PTI and the National Association of Wool Manufacturers, was held June 10-14, while a two-day Textile Education Seminar, conducted for the faculties of the nation's textile colleges, occupied the calendar June 24-25.

Edwin Wilkinson, executive vice president of the NAWM, explained the purpose of the earlier seminar, which featured the following presentations; "What's New with Wool", Gerald Laxer, The Wool Bureau; "The Man-made Fibers and Their Possibilities with Wool", J B Goldberg, textile consultant; "The Importance of Textiles to National Defense", Maj Gen Webster Anderson, Philadelphia Quartermaster Corps; "Yarns in Fabric Styling," Erving Layton, Pacific Mills Inc; "Engineering of Fabrics," Myron J Coplan, Fabric Research Laboratories, Inc; "Developments in Finishing," Werner von Bergen, Forstmann Woolen Co; "Advances and Limitations in Coloration," Stuart Wilkinson, PTI; "Men's Wear Styling," Chauncey Babcock, J P Stevens Co, Inc; "Color- A Foundation of Fashion," Helen Taylor, color consultant; "Styling for Women's Wear," Silas Rieger, Berglas, Rieger, Inc; "Styling," Susan Eastman, William Heller, Inc.

Also, "Production Planning," John Honig, Anglo Fabrics Co, and D J Fox, J P Stevens Co, Inc; "Quality Control — Wool-Worsted Blends," Mark A Indik, Nathan Schwartz & Sons; "Costing Theory and Practice," Ellsworth D Baker, Barnes Associates; "Specific Costing Practice in Woolens & Worsteds," John Drury, Commery, Davis & Jacobson; "Marketing Research," Fessenden S Blanchard, Fessenden S Blanchard & Morrell; "Advertising for an Industry," Jock Elliott, BBD&O; "Textile Problems as Seen by a Clothing Manufacturer," Michael Daroff, H Daroff & Sons; "What Retailers Expect of Clothing Manufacturers," E J Hasketh, Jacob Reed's Sons.

Speakers at the final session of the "Textiles Today" seminar were Adrian McDonough, director, Taylor Management Laboratories, Wharton School, Univ of Pennsylvania, and Francis Pratt, head, American Institute of Mens and Boys Wear. Mr Pratt spoke on "Public Relations."

The two-day textile education seminar featured papers by A H McCollough, *Modern Textiles*, on "Industry's Views on Textile Education;" E A Murphy, North Carolina State College, on "Objectives of Textile Education;" John H Dillon, Textile Research Institute, on "Textile Research and Day After Tomorrow;" Charles F Edlund, Lowell Technological Institute; Thomas Edman, Philadelphia Textile Institute; and Bertrand Hayward, PTI on "Good Teaching Practices."

The textile education seminar was closed with group discussion of textile text books under the direction of L H Hance, Institute of Textile Technology, with a panel including: J J Press, *Man-Made Textiles Encyclopedia*; A H McCollough, and Percival Theel, PTI.

• NAMES IN THE NEWS •

Goodale

Sullivan

Wizemann

Dozier

Sir Ernest Goodale was recently elected president of the Textile Institute for an unprecedented second time.

Sir Ernest Goodale was president of the Textile Institute in 1939-1940, was awarded the Institute Medal in 1954 and was admitted as a Companion Member of the Institute in 1956. He is chairman and managing director of Warner & Sons Ltd, of which he became director and secretary in 1928. The offices he holds include those of president of the Silk & Rayon Users' Association; honorary president of the International Association of Users of Yarn of Man-Made Fibres; a vice president of the International Silk Association; a vice president of the British Man-Made Fibers Federation; chairman of the Furnishing Fabric Federation; president of the Furnishing Fabric Manufacturers' Association; president of the British Colour Council and a vice president of the Royal Society of Arts. He is a vice president of the Federation of British Industries and chairman of the Industrialists Committees. He was chairman of the London Section in 1950-1952, and he serves on the Institute's International Relations Committee and on the Textile Terms and Definitions Committee.

G Rodney Wick has been named special assistant to the director of research of the Dyestuff and Chemical Division of General Aniline & Film Corporation. As his first assignment, Mr Wick will act as technical coordinator for the Research Department phases of the Company's new ethylene oxide project at its Linden, N J, plant.

Until recently Mr Wick was a consultant on process and mechanical design, and economics of ethylene, propylene and vinyl chloride production facilities for H C Schutt & Associates, consulting engineers of Boston, Mass.

Allied Chemical & Dye Corp on July 1st announced the following personnel moves:

In the National Aniline Division, **Paul J Sullivan** has been named resident manager of the Philadelphia Sales Branch and **Leslie C Wizemann** has been appointed manager-detergent sales. At the same time, the retirement of **R Robertson** was announced to become effective September 1.

In his new position, Mr Sullivan, formerly manager of detergent sales, will report to **Harold L Rieg**, director-dyestuff sales and branch operations.

Mr Wizeman will be located at 40 Rector St, New York, and report to **O M Morgan**, director-chemical sales. He has been active in the sales development of the Nacconols.

In the Solvay Process Division, **Verne W Aubel, Jr**, has been named assistant director of sales; **Kenneth M Dillabough** succeeds Mr Aubel as manager of the Philadelphia sales branch; and **Raymond L Copson** has been appointed to the post of assistant to the director of development.

Dr Copson has been in charge of research and development for Mutual Chemical at the latter's Baltimore Laboratory. Mutual has been affiliated with Solvay Process since January 1, 1957.

Eldon Stowell has joined Brant Yarns, Inc, New York in an executive capacity. In addition to becoming technical director, Mr Stowell will assist Brant Yarns in sales and developments of new products. Among other mills, Brant Yarns represents Belmont Throwing Corp, Belmont, NC, and Adelaide Mills, Anniston, Ala.

Mr Stowell recently resigned from Universal Winding Co where for the past several years he served as company textile engineer and had charge of yarn and yarn product development.

Henry L Dozier has been named technical sales representative for Georgia and Alabama by Emkay Chemical Co, Elizabeth, NJ.

Mr Dozier has had broad experience as a dyer and superintendent of dyeing at Avondale Mills, Spencer Mills, Adelaide Mills and Katherine Mills. He will work out of Dalton, Ga.

The New York Microscopial Society, at its annual banquet in May, elected **Charles Maresch,** manager of the Research Service Section of the Bound Brook Laboratories, Research Division, American Cyanamid Company, a Fellow of the Society and presented him with the Ashby Award.

The Ashby Award is the highest honor the Society can confer and is awarded at the discretion of the Board of Managers for outstanding service to the Society. Election as a Fellow is based on unusual contributions to the organization or distinctive achievements in microscopial science.

The Society was founded in 1877, for the advancement of theoretical and applied microscopy. The Ashby Award was set up in memory of George E Ashby, a member of the Society for 67 years and its president for 14 years.

Dr Maresch, presently a member of the board of managers, has served as secretary and vice president of the Publicity, Symposium, Advisory and Banquet committees and was editor of the Society's first year book published in 1952.

The retirement of **Harry C Brown**, chairman of the division of engineering at Lowell Technological Institute, has been announced by President Martin J Lydon, effective September 1.

Professor Brown has been a member of the LTI faculty since 1919. He has served as head of Lowell Tech's textile engineering department since 1955.

Mason

The appointment of **William B Mason** as sales manager for Mid- and Far Western Division of Intex Chemical Corporation of Lodi, NJ has been announced by Leon P Brick, president.

Mr Mason will have full charge of the Division offering a complete line of textile chemicals. With over ten years of experience in the field of surface-active agents, Mr Mason recently resigned from his post as district sales manager for Onyx Oil & Chemical Co.

He will continue to make his headquarters in Cleveland.

Fabric Research Laboratories, Inc, Dedham, Mass, has announced that **Robert F Pierce** has joined the summer staff of the laboratories.

Mr Pierce is a physics and mathematics teacher at Westwood High School. He is the first science teacher to be employed by Fabric Research Laboratories under the newly inaugurated FRL Science Teachers Plan. By this plan, FRL will employ at least one science teacher each year during the summer months.

At Fabric Research Laboratories Mr Pierce will be engaged in investigations of the physical and mechanical properties of polymeric materials.

The transfer of ten technical representatives was recently announced by Union Carbide Chemicals Co, Division of Union Carbide Corp.

The transfers are: **D H Merry** to the St Louis District Sales Office, **T L Proctor** to the Detroit District Sales Office, **R G Short** to the Cincinnati District Sales Office, **E A Vierengel** to the New York District Sales Office, and **A H Welle** to the Boston District Sales Office.

Other new assignments are: **A A Douglas** to the Albany District Office; **R R Failla** to the Buffalo District Office; **H R Hubbs** to the Charlotte District Office; **C D Schmidt** to the Newark District Office; and **R J Spath** to the Chicago District Office.

Kaplan

Prien

Morey Kaplan and **Walter F Prien** have been appointed to the faculty of the Philadelphia Textile Institute, Mr Kaplan as an instructor in the Chemistry and Dyeing and Research Departments, and Mr Prien as an associate professor in the Microscopy and Testing Department.

William B Bowman, assistant general manager, Organic Chemicals Division, American Cyanamid Co, is the newly elected Honorary Chairman of the American Section, Society of Chemical Industry, for the year 1957-1958. He succeeds **Monroe E Spaght**, executive vice president, Shell Oil Company, New York.

Other officers of the section elected are: *honorary vice-chairman,* **F J Emmerich,** chairman of the board, Allied Chemical & Dye Corp; *honorary treasurer,* **John S Parkinson,** research manager, Building Products Dept, Johns-Manville Research Center; *honorary controller,* **Robert Heggie,** director of research, American Chicle Co; *honorary secretary,* **R W Cairns,** director of research, Hercules Powder Co.

Members of the Executive Committee elected for three years are: **Lauchlin M Currie,** Union Carbide Nuclear Co; **William H Lycan,** Johnson & Johnson; **Frank C McGraw,** E I du Pont de Nemours & Co, Inc; and **Hans Stauffer,** Stauffer Chemical Co. **W E Hanford,** The M W Kellogg Co, was elected member of the Executive Committee for two years, and **Kenneth H Klipstein,** American Cyanamid Co for one year.

Others who continue as members of the Executive Committee are: **Anthony L Carrad,** Imperial Chemical Industries (New York) Ltd; **Sydney T Ellis,** Commercial Solvents Corp; **Thomas H Vaughn,** Pabst Brewing Co; **Wayne E Kuhn,** The Texas Co; **R W McNamee,** Union Carbide Corp; and **E Duer Reeves,** Standard Oil Development Co.

The Society of Chemical Industry, an international society, this year celebrates its Diamond Jubilee. Its American Section, formed in 1894, was the first chemical society in the United States to bring together those interested in industrial chemistry.

Barnard

Richard L Barnard, appointed southern representative of David Gessner Co, Worcester, Mass, is in charge of the new Gessner southern office recently opened at 222 Piedmont Bldg, Greensboro, NC. Mr Barnard joined Gessner in the spring of 1949.

Paul F Riedl, Gessner service representative and erector, has also moved to Greensboro and will make his headquarters in the same office.

Gaston Gage, professor of textiles and head of the yarn manufacturing department at Clemson College, has been named acting dean of the School of Textiles. He succeeds **Hugh Brown,** who resigned recently.

OBITUARY

William J Thackston Jr

WILLIAM J THACKSTON JR died June 15 at his home in Myrtle Beach SC. He had been in charge of Rohm & Haas Company's Textile Chemicals Sales Department in Philadelphia for thirteen years until illness forced him to curtail his activity last year. He was 47.

After receiving a BS degree in chemistry at The Citadel, Mr Thackston engaged in graduate study at Cornell University. In 1936 he was employed by Rohm & Haas Company as a chemist in its central research laboratory in Philadelphia. The following year he became a salesman of textile chemicals. In 1941 he was placed in charge of the company's textile sales-service work, and two years later was appointed sales manager of the Textile Chemicals Department.

TECHNICAL LITERATURE

(It is understood that the following literature is available from the sources listed in italics).

ALGOL BRILLIANT BLUE 4G INFRA PASTE AND ALGOL BRILLIANT BLUE 4GWP POWDER——*Circular G-797, General Dyestuff Co, 435 Hudson St, New York 14, NY*——These new products are described as two physical forms of a new, straight, greenish-blue, vat dyestuff characterized by exceptional brightness of shade and by outstanding lightfastness on both cotton and rayon. Except for poor fastness to chlorine and fair fastness to oxidizing gases like ozone and oxides of nitrogen, this product is said to display a generally good level of fastness and working properties. It therefore finds a reasonably wide range of usefulness where fastness to chlorine or other oxidizing agents is not required.

Outstanding features are said to be excellent dispersibility and exceptional stability of the paste brand in storage.

The circular is divided into the following sections: Properties (shade and fastness, working properties); Uses: Application (reduction, padding methods, circulating machines, soaping dyeings); and Fastness Ratings of Full Shades on Cotton and Rayon. Samples of dyeings on cotton yarn and rayon yarn at 1, 5 and 20% and pigment paddings on cotton sheeting and spun rayon at 0.8, 3.25, and 13 oz per gallon are included.

CRITICAL DATA TABLES——*$4.00: Corn Industries Research Foundation, 1001 Connecticut Ave, NW, Washington 6, DC*——This 450-page statistical volume is described by the Foundation as "the most complete compilation to date of tables, charts, graphs and similar information pertaining to processes and products of the corn-refining industry."

An earlier edition, limited to distribution within the industry, has gained increasing attention among libraries, universities and other industries as a reference source. For this reason the volume has now been revised, published and made available to the general public at cost, the Foundation states.

The book contains sections devoted to important physical properties of products from corn and related products, including corn syrup, corn sugar, dextrose and sucrose, starch and dextrin, vegetable oils, grains and feeds. Detailed statistical treatment is given to such subject headings as analysis, boiling points, freezing points, moisture equilibrium, refractive indices, viscosities, specific heats, densities, optical rotations, flash and fire points, and solubilities. In addition, essential humidity and water tables, factors, corrections and conversion tables are included. The book is indexed to facilitate use of the data.

Preparation of the volume stemmed from projects of the Foundation's Technical Advisory Committee, an industry-wide group of scientists. George E Corson of Clinton, Iowa, assembled the material. Contents of the book were drawn from numerous industrial and governmental sources as well as studies which have been published in trade and technical journals.

EXACT WEIGHT SHADOGRAPH SCALES——*The Exact Weight Scale Co, 944 W Fifth Ave, Columbus, O*——This new 8-page brochure is designed for use in the textile industry. It contains numerous illustrations, detailed specifications, and important features of 34 different models, ranging in capacities from 2000 mg up to 100 lbs. (Ask for Form 3333.)

GELVA KR POLYVINYL ACETATE EMULSIONS——*Dept EF, Shawinigan Resins Corp, Springfield, Mass*——This manual on the use of Gelva KR for textile finishing contains full information on the physical properties of the various KR types. In separate sections it deals with the compounding and application techniques for the KR emulsions. Also included in the booklet is a complete section covering a wide variety of typical application formulations.

Gelva KR emulsions are used as a finish for cottons and synthetics to improve hand and stiffness.

JONES BRIDGE' FOR PRECISE ELECTROLYTIC CONDUCTIVITY MEASUREMENTS——*Data Sheet E-95(2), Leeds & Northrup Co, 4934 Stenton Ave, Philadelphia 44, Pa*——This sheet lists complete specifications of the Jones Bridge and such related accessories as highly precise conductivity cells and a constant temperature bath. Also shown is a schematic diagram demonstrating a typical laboratory setup.

NEUTRONYX 600 IN THE TEXTILE INDUSTRY——*Onyx Oil & Chemical Co, Warren & Morris Sts, Jersey City 2, NJ*——This comprehensive application manual details cost savings in many areas. Application methods are described for achieving lower costs in wool scouring, fabric fulling, carbonizing, and color stripping, and in rayon and cotton wet processing, bleaching, desizing, as a dyeing and finishing assistant, for scouring dyed or processed goods, in oxalic acid rust removal, and in emulsifying mineral oil.

Neutronyx 600, a new, completely synthetic, nonionic surfactant, is said to be characterized by extreme versatility, stability, and chemical compatibility.

PROCEEDINGS OF THE FIFTH SOUTHERN MUNICIPAL AND INDUSTRIAL WASTE CONFERENCE, 1956——*$1.50; Extension Div, Univ of North Carolina, Box 1050, Chapel Hill, NC*——This 261-page volume comprises 28 papers, including keynote by Gordon M Fair on "Water Resources and Waste Disposal Requirements," and technical papers on municipal, textile, chemical and food processing wastes. Also included are transcripts of discussions and registration list.

SULFONATE OS——*Sun Oil Co, Philadelphia 3, Pa*——Sun Technical Bulletin No. 51 describes Sulfonate OS, an anionic surfactant for the manufacture of oil-soluble rust and corrosion inhibitors and emulsifying, wetting and dispersing agents.

THE INDUSTRIAL CHEMISTRY, PROPERTIES, AND APPLICATION OF SILICONES——*$1.50; American Society for Testing Materials, 1916 Race St, Philadelphia 3, Pa*——A copy of the 1956 Edgar Marburg Lecture by Charles E Reed, presented at the 1956 Annual Meeting of ASTM.

Dr Reed is general manager of the Silicone Products Dept, General Electric Co, Waterford, NY.

The purpose of the Edgar Marburg Lecture is to have described at the Annual Meetings of the American Society for Testing Materials, by leaders in their respective fields, outstanding developments in the promotion of knowledge of engineering materials. Established as a means of emphasizing the importance of promoting knowledge of materials, the Lecture honors and perpetuates the memory of Edgar Marburg, first secretary of the Society.

WEATHERING RESISTANCE OF FUNGICIDAL VINYL-COATED COTTON FABRICS——*Report PB 121913; J C Saylor, Wright Air Development Center, Jan 1957; 40 pages; obtainable for $1.00 from OTS, U S Dept of Commerce, Washington 25, DC*——Cotton fabrics coated with vinyl formulations containing the fungicide copper 8—hydroxyquinoline (Cu-8-Q)—have shown satisfactory weather resistance and color stability after outdoor exposure tests, according to an Air Force research report just released to industry.

Cu-8-Q, the standard Air Force treatment for the fabrics at the time, was shown superior to the fungicide dehydroabietylammonium pentachlorophenoxide (DAAP). Fabrics coated with Cu-8-Q maintained satisfactory strength and color after outdoor exposure, while DAAP was deficient in weather resistance and showed a definite sensitivity to radiant energy. The fabrics were exposed to four climates and evaluated for breaking and tearing strength, color change, and the effects of radiant energy from the sun.

• NEW PRODUCTS AND DEVELOPMENTS •

Irgalan Red 4GL

A new yellowish-red dyestuff, with a reported superior fastness to light, has been added to the Irgalan series of neutral-dyeing premetalized dyestuffs by Geigy Dyestuffs, Division of Geigy Chemical Corporation, Ardsley, N Y. It is intended for dyeing wool, silk or nylon and blends with cellulosic fibers.

The new coloring agent, Irgalan Red 4GL, completes the red portion of the spectrum in the Irgalan series of dyestuffs having a high degree of lightfastness. The other members of the series are Rubine RL and Bordeaux 2BL for the blue cast and Red 2BL for the neutral.

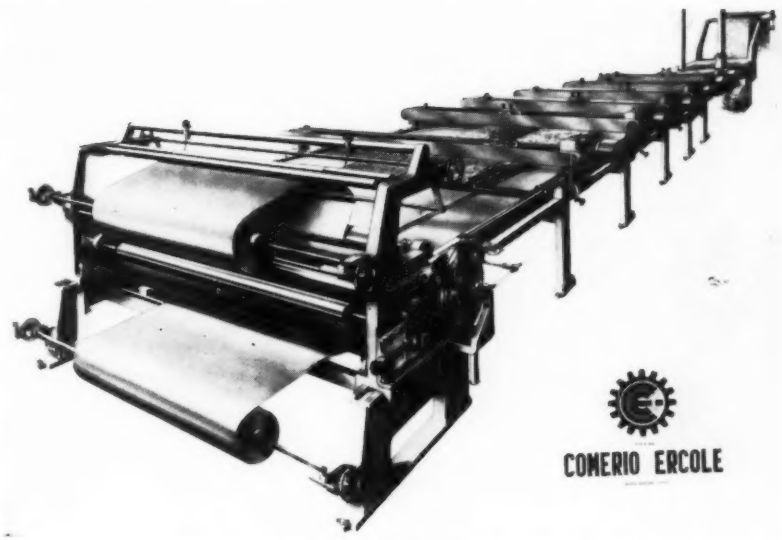
Irgalan Red 4GL has very good fastness to perspiration and washing and high resistance to wet mill processing, according to Geigy It is stated that Irgalan Red 4GL, like all the Irgalan dyestuffs, has proven economical because of the considerably shorter processing time required for application as compared to strong acid or chrome colors. At the same time Irgalan Red 4GL is said to produce extremely level, well-penetrated shades. The reduced time required for fabrics to remain in the boiling dye solution results in a minimum effect on wool quality, which makes for a higher grade fabric, it is claimed.

Irgalan Red 4GL is said to be completely compatible with all other Irgalans in both drawing properties and fastness; hence it is suggested by Geigy as a shading element as well as a self shade.

Atcofix #90

Metro-Atlantic, Inc, Centredale, R I, has announced the development of Atcofix #90, which they describe as "a superior resin-based, cationic, dye-fixing agent for direct colors." This product reportedly may be applied either by exhaustion or padding to produce a marked increase in the overall wetfastness of many direct colors.

Atcofix #90 is said to be compatible with all of the commonly used thermosetting resins, and it reportedly will produce excellent results when run in combination with resins. In addition to its dye-fixing properties, Atcofix #90 is said to produce a moderately firm hand in most fabrics to which it is applied.



Comerio Ercole's Multiple-color Automatic Screen Machine

Multiple-color Automatic Screen Printer

A four- to ten-color automatic screen printing machine, manufactured by Comerio Ercole of Italy, is now being offered for export to the United States through Elmo International, 7 Church Street, Paterson, N J, sole agents for the Italian firm.

The machine is said to be capable of printing all types of fabrics in any width. Hourly production is reported to be very high, depending upon the number of colors and repeat of pattern being printed.

The machine is equipped with drying chamber and televisive control board for remote survey of operating stages. Predrying blowing nozzles placed between the printing units and a backgrey unit for printing of sheer fabrics are available if desired.

A patented selector for automatic preset and periodical connection or exclusion of printing units is also available for use in printing long tablecloths, saris, cross border designs, etc.

A flocking device is available as optional equipment.

It is reported that delivery can be made in three months, and the first machine is expected to be operating here this month.

Detailed brochures are available by writing to Elmo International at the above address.

EFFI

Fiber Research Corp, a jointly owned subsidiary of The Top Company of Boston, Mass, and National Research Corp, Cambridge, Mass, has introduced a new system for the measurement and grading of textile fibers. The machine, designated EFFI (Electronic Fiber Fineness Indicator), is a desk size unit which rapidly scans the diameters of fibers contained on a sample slide and computes the average diameter of the sample and the percentage of fibers whose diameters are within selected distribution groups. Operation is automatic and answers appear on direct reading counters. Results are said to be rapid, accurate, and independent of human judgment. An accurate one thousand fiber determination can be made in about five minutes, it is claimed.

EFFI has been designed so that it can be operated by a semiskilled technician. It is the result of a joint research project by The Top Company and National Research Corp. The aim of the program was to develop automatic equipment for fast accurate grading of wool fibers.

EFFI reportedly will accurately measure the diameters of all wool fibers normally used in apparel. The range includes fibers with diameters from less than 10 to more than 40 microns with a median of about 25 microns. In terms of grades, the range

Operator prepares to insert sample into the optical system of EFFI. The instrument will measure the diameters of 1000 fibers in 5 minutes. Average diameter is indicated on the large meter in the center panel. Distribution by U S Department of Agriculture groups is recorded on counter tubes on right hand panel (nearest camera).

includes 80s through 36s.

In determining the average diameter of fibers, the working accuracy of EFFI is said to closely approach the theoretical statistical limit arising from measuring a finite sample of 1000 fibers. For a 62s grade, for example, this limit (standard error of the mean) is typically 0.17 micron. During extensive tests when measuring a standard sample of 62s provided by the United States Department of Agriculture, the machine reputedly produced readings with a standard error of 0.2 micron.

Measurements on a single slide can be repeated within a variation of about 0.1 micron, it is claimed, and a quick double check can be made by simply reversing the slide. One thousand additional fibers reportedly will be measured in less than three minutes.

To make a fiber determination, a group of several thousand fibers is cut (from wool top sliver) to a length of about 200 microns. These cuttings are laid parallel on a microscope slide, which is inserted in the optical system of the EFFI Fiber Grader. The operator presses a button to start the machine and from this point on all operation is automatic and the operator is free to prepare the next slide.

In the optical system the slide passes through a beam of light. After each pass the slide is mechanically indexed forward a short distance to bring new fibers into the beam and is passed through again. This slide motion is repeated until a count of 1000 has been completed and the machine stops automatically.

The image cast by each fiber as it passes through the light beam is magnified and presented to a photomultiplier tube which produces an electrical output signal as soon as the leading edge of the fiber is "seen" by the photo tube. The output signal from the tube continues until the trailing edge of the fiber has passed; the duration of the signal is a measure of the diameter of that particular fiber.

The signal from the photomultiplier tube is passed to a counting circuit. An averaging circut "remembers" the interval of time each fiber is in the light beam so that when the one-thousandth fiber has passed the slit, a direct measure is available of the average of the 1000 diameters.

Counter tubes are used to indicate the diameter group distribution of the 1000 fibers counted. The machine is set to indicate the groups designated by the United States Department of Agriculture as standards for wool fiber fineness.

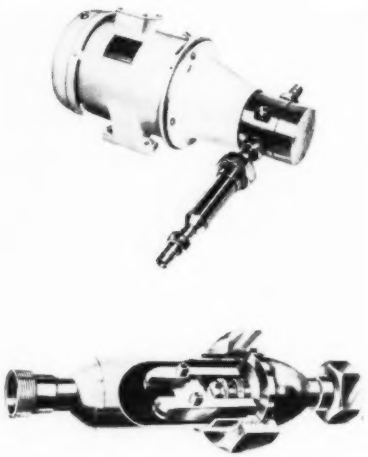
The EFFI Fiber Grader is available to industry on a rental basis, which will include maintenance, regular service, and replacement of parts as required.

New Line of Ultrasonic Emulsifiers

In a new line of ultrasonic emulsifiers . . . called the Rapisonic, the Autosonic, the Dispersonic and the Minisonic . . . a new principle of operation is used, which reportedly has resulted in considerably less expensive and easier-to-maintain machines compared with ultrasonic equipment heretofore available. It also is said to offer faster and more complete emulsification.

These machines use the fluid-dynamic forces of the liquids themselves to produce the sound waves. This is accomplished by impinging the liquids to be emulsified in a jet stream on the edge of a blade. The blade vibrates at its natural frequency (about 22,000 cps). Cavitation occurs continuously in the stream rushing past the blade. All energy is developed and used right in the liquids.

Textile applications of the equipment, handled by Sonic Engineering Corp, 146 Selleck St, Stamford, Conn, include the following: waterproofing emulsions, helizarine binder, bleaching emulsions, lubricating emulsions, dye dispersions, paraffin wax proofing emulsions, cotton proofing emulsions, wool creams, textile printing binder, size, vat dye dispersions, titanium dioxide dispersions.

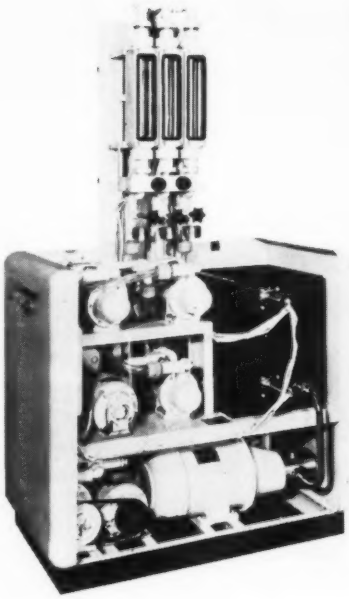


Top—Rapisonic

Bottom—Ultrasonic head

The Rapisonic consists of a gear-type pump and ultrasonic head driven by a 2-hp motor. It has a reported output up to 350 gallons per hour and handles emulsions of high and low viscosity. It is said to produce a homogenous field; no pre-mix is necessary. The Rapisonic will not incorporate air during sonification. It is easily bolted or clamped to any firm support near the processing vessel.

The Autosonic emulsifier is designed to meet the need for a continuous supply of emulsion automatically geared to process volume. The oil, water and emulsificant are pumped separately into the Autosonic via three control valves and flow rate indicators in order to adjust the proportions of each in the final emulsion. Float switches maintain a balance in a res-



Autosonic

ervoir by starting and stopping the feed and discharge pumps as well as the emulsifying unit. The Autosonic incorporates the Rapisonic emulsifying unit.

The Dispersonic differs from the Rapisonic in that it is designed to handle dispersions of powders in liquids or emulsions of an abrasive nature. While it uses the same type of ultrasonic head, it substitutes a continuous cavity pump for the gear pump of the Rapisonic. The former pump resists better the abrasive effects of many powders when they are pumped at the pressures required for the development of ultrasonic energy.

Dispersonic

A 3-hp motor reportedly provides a continuous output of 300 gallons per hour. Mounted endwise on legs, off the floor, it is set into place and moved as demands change.

The Minisonic is for laboratory or pilot plant use and is similar to the Rapisonic in principle of operation. Instead of being on the production line, it is a batch-type machine with a capacity of one gallon in the double-shell, funnel reservoir. Progress of emulsification can be observed in the transparent hose running from the ultrasonic head to the reservoir. It handles emulsions of high and low viscosity.

All parts of the machines are readily accessible for cleaning. Parts in contact with the liquids are of stainless steel or are plastic coated.

Minisonic

Synthravon SL

Synthravon SL, a new textile softener which can be applied to cellulosic yarns and fabrics, has been introduced by Arnold, Hoffman & Co, Inc, Providence, R I.

Arnold, Hoffman describes Synthravon SL as an inexpensive, easily handled softener and lubricant which is particularly suitable for undyed yarns and fabrics because it will not yellow or cause rancidity to develop. Heat resistance and stability in storage and in finishing baths are also said to be excellent. Chlorine retention reportedly is nil.

Cellulosic yarns or fabrics to which Synthravon SL has been applied are said to be markedly easier to handle during mechanical operations, such as winding, sewing or napping. Equally important is the pleasing lofty hand acquired by fabrics finished with this new softener, it is stated.

Scholl Skein Dyer

Scholl Skein Dyer

A new, high-temperature and high-pressure skein-dyeing machine, made by Scholl Ltd of Switzerland, is now being introduced in the United States by Cosa Corporation, 405 Lexington Ave, New York 17, N Y.

Especially adapted for high temperatures up to 230°F, this skein dyer reportedly can be used for dyeing wool and all synthetic materials. Cosa states that it will provide extremely good results with high bulk Orlon since it uses the double stick method, which controls the amount of bulking. It is further stated that no stick marks, channeling or wrinkling can occur in the yarn. The advanced design of the Scholl Skein Dyer reportedly permits both high temperatures and high pressures and full penetration of the dye liquor into the yarn, and as a result, color impregnation is completely uniform. This design also includes a special pump which is said to assure uniform dye liquor circulation at all points in the machine—preventing any variation among and between the skeins. The top of the yarn carrier in the Scholl Skein Dyer acts as a cover—facilitating handling of the material.

The Scholl Skein Dyer is available with capacities of 25-, 55-, 125- and 250-lb dye lots. In the 250-lb machine the material carrier separates the tank into two compartments of 125 lbs each, so as to guarantee even flow of the liquor. Two or more machines can be coupled together for dyeing to the same shade. The Scholl Skein Dyer is built of type 316 stainless steel. Compact in construction and entirely new in design, this machine not only shortens the dyeing process but provides complete protection of the material, it is claimed.

Chlorade

Metro-Atlantic, Inc, Centredale, R I, recently announced an aggressive merchandising program for Chlordare, a patented finish, that reportedly enables wash-and-wear fabrics to be safely bleached by housewives and commercial laundries without fiber degradation or yellowing.

Joseph Buonanno, president of Metro-Atlantic, Inc, stated:

"We wanted to be right. Our laboratory technicians proved that you can bleach wash-and-wear with Chlordare. We decided to run trials in 35 plants. After these trials, continuous plant runs proved, without a doubt, that Chlordare does the job better and more economically than any of its imitations. And it's guaranteed to withstand 'hot iron' pressing without harming or yellowing the fabric. Chlordare's chlorine resistant properties are permanent, even after repeated washings, and will withstand the AATCC chlorine retention test without any yellowing or loss in tensile strength. It's tops in crease resistancy and shrinkage control. It's ease of application, economy and proved performance make it a 'must' for any wash and wear fabric that must be bleached."

Zacone

Zimmerman Associates, Chemists and Engineers, Guilford College, N C, has announced the commercial production of "a new, low-cost, nonyellowing, stain-resistant, silicone softener—Zacone—for the textile and related trades." Heretofore, this softener has been produced in the pilot plant for a period of one year for use in a large finishing plant and is now reportedly finding wide acceptance throughout the trade.

Zacone is not an emulsion but is said to form true solutions of excellent stability to heat, salts, dye fixatives, etc. It is reported to be particularly suitable for use in all types of resin finishes. In "wash-and-wear" cottons, it is said to increase the abrasion resistance and tear strength and the crease recovery angle to a marked degree. Zacone reportedly inhibits the formation of formaldehyde odor in resin-treated goods on storage or steam pressing and also decreases the chlorine retention in many cases.

It may be used with all silicone water repellents to provide additional softness and lubricity. For pure finishes, a catalyst may be employed to provide additional stain resistance.

Abstracts

Modern Detergents

Harwood, F C, *Dyer* **117**, 602-3, April 12, 1957.

A detergent, according to the author, is a surface-active agent which, to be effective, must perform the following functions: 1) wet the surface of the substance to be removed (soil) and eventually the surface of the material to which the soil adheres; 2) displace the soil from that surface; 3) emulsify the soil after it is removed; 4) suspend it and prevent its redeposition on the original surface.

The author points out that, in soft water, soap fulfills every requirement of a good detergent: it is soluble in water, a good wetting agent, and will remove, emulsify and suspend the soil; but it is not compatible with hard water. In commercial laundries, soft water is used, and an alkali is added to the soap (eg, soda ash or sodium metasilicate) to prevent hydrolysis. In this field, soap is still the premier detergent.

In the home, the washing is usually done in hard water. If soap is used, calcium and magnesium soaps are precipitated. Here the synthetic detergents have found a ready market, since they are compatible with hard water.

It is stated that in the US over 60 percent of the total detergent market has been captured by synthetics; in the United Kingdom the figure is nearly 40 percent.

The author gives statistics showing the proportions of the various detergent types used in the United Kingdom in these three fields: in the domestic market, for industrial cleaning, and for industrial processing. He also discusses the methods of manufacture of the principal types.

Analyses are given of four typical synthetic detergent mixtures. These show a surprisingly large number of different chemical components, each added for a particular purpose. A small amount of C M C added to a synthetic greatly improves its suspending power, making it more in line with soap in this respect.—WHC

New Bleaching Range for Use with Sodium Chlorite

Technical Service Staff, Sir James Farmer Norton & Co Ltd, *Canadian Textile J* **74**, 71-2, April 5, 1957.

It has been known for a long time that fabrics can be bleached with sodium chlorite with considerable advantage, provided a suitable plant is available. The authors believe that the range described in this article is the simplest and most effective yet produced.

When a plant specifically designed for the purpose is used, the sodium chlorite bleach has a number of advantages, including the following:

There are no kier boils, chemicals and sours, and the number of washing operations is reduced.

There is a saving in labor and steam.

The cloth is bleached in quicker time, at lower cost and with less loss in weight.

The cloth can be handled in the open width throughout, and has good absorbency and wettability and excellent strength.

In the usual process for bleaching with chlorite, the cloth is first desized. It is then impregnated with an acidified sodium chlorite bleaching solution at a low temperature, squeezed, and passed into a heated chamber where it is stored for a given period at a given temperature to complete the reaction. It is then washed thoroughly.

Up till recently it has been considered that the cloth should be stored in batches inside the storage chamber. The authors recently inspected a German range for bleaching with chlorite in which the cloth is stored in the reaction chamber on a special conveyor instead of in batches. They report that the reaction time is shortened from 5-6 hours to 1 hour, chemical consumption is less, and continuous running is made possible (the fabric is piled on to one end of the conveyor and taken off at the other). Other advantages are also cited.—WHC

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